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Sampling and Analysis Plan for Sediment Characterization at Terminals 1, 2, and 5

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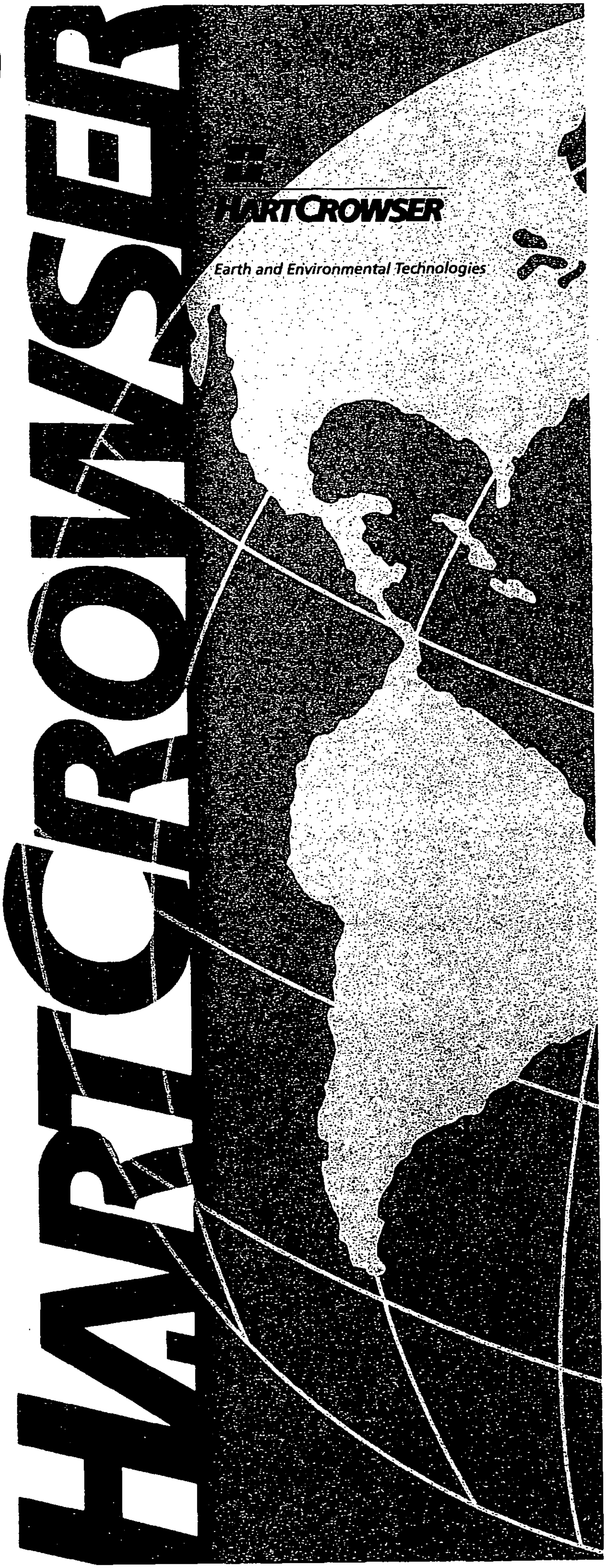

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BT	Bioaccumulation Triggers
COC	Chemical of Concern
Corps	U.S. Army Corps of Engineers
CRD	Columbia River Datum
DEQ	Oregon Department of Environmental Quality
DGPS	Differential Global Positioning System
DMMU	Dredge Material Management Unit
EPA	United States Environmental Protection Agency
ML	Maximum Level
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
Port	Port of Portland
PSDDA	Puget Sound Dredged Disposal Analysis
QA/QC	Quality Assurance/Quality Control
SL	Screening Level
TBT	Tributyltin

SAMPLING AND ANALYSIS PLAN FOR SEDIMENT CHARACTERIZATION AT TERMINALS 1, 2, AND 5

1.0 INTRODUCTION

1.1 Project Description

The Port of Portland proposes to conduct maintenance dredging at Marine Terminals 1, 2, and 5 located on the Willamette River (see vicinity and location maps, Figures 1 through 5) to remove sediment that has accumulated primarily as a result of the floods occurring in the winter of 1995-1996. At Terminal 1, maintenance dredging is proposed along Berth 104 to maintain berth elevation of -25 feet below Columbia River Datum (CRD) and would remove approximately 7,987 cubic yards of material from the mooring area. At Terminal 2, maintenance dredging is proposed for Berths 204, 205, and 206, to maintain berth elevation of - 40 feet and would remove approximately 10,053 cubic yards of material from the mooring area. At Terminal 5, maintenance dredging is proposed for the barge slip to maintain berth elevation of - 15 feet and would remove approximately 1,221 cubic yards of material from the barge slip. Estimated total dredging quantity for the three terminals is approximately 19,261 cubic yards, including one foot of overdredge.

Dredging will be by clamshell and barge. Depending on the results of the sediment characterization proposed in this sampling plan, disposal will be either inwater to Morgan Bar (Columbia River at Mile 100 - 101), or confined inwater at the Ross Island Disposal Facility. It is possible that each site may receive some of the dredged materials.

1.2 Sediment Description

Based on historical data gathered at these three terminals, it is anticipated that the majority of the dredge material will consist of fine grained sediments containing 60 to 90 percent fines and 6 to 9 percent total volatile solids. In this section, existing sediment quality data from the terminals is compared to sediment screening levels set forth in the Dredged Material Management Manual for Grays Harbor and Willapa Bay (Corps, 1995).

At Terminal 1, Berth 104, maintenance dredging was conducted in 1974 with the removal of 1,300 cubic yards and again in 1975 with the removal of an additional 60,000 cubic yards of dredge material. The sediment was characterized as 87% silt/clay with 7.9% total volatile solids. A sediment quality summary of Berth 104 from December 1, 1982, indicated that detectable concentrations of the copper, lead, arsenic, and PCB-1260 were found in the sediment, though these concentrations were below sediment screening levels.

At Terminal 2, Berth 204, maintenance dredging was conducted in 1990 (13,000 cubic yards removed), 1993 (7,000 cubic yards removed), and 1995 (5,000 cubic yards removed). The sediment was characterized as 86.3% silt/clay with <8.6% total volatile solids. A sediment quality summary of Berth 204 from September 16, 1995, indicated that detectable concentrations of the copper, lead, arsenic, Polycyclic Aromatic Hydrocarbons (PAHs), and tributyltin (TBT) were found in the sediment, though these concentrations were below screening levels.

At Terminal 2, Berths 205 and 206, maintenance dredging was conducted in 1975 and 1980 with an unknown volume of dredge material removed and in 1984 (5,700 cubic yards removed), 1988 (4,200 cubic yards removed), 1990 (2,800 cubic yards removed), 1993 (7,000 cubic yards removed), and 1995 (5,000 cubic yards removed). For these sediments, grain size characterization ranged from 81.3 to 83.7% silt/clay with total volatile solids ranging from 8.9 to 9.2%. A sediment quality summary of Berth 205 and 206 from September 16, 1995, indicated that detectable concentrations of the copper, lead, arsenic, PAHs, and tributyltin were found in the sediment. The concentrations of metals and PAHs were below screening levels. The concentrations of TBT (204 ug/kg at Berth 205) were above the current PSDDA (Corps, 1995) TBT screening level of 30 ug/kg but between the minimum and maximum TBT screening levels presented in draft EPA guidance (Weston, 1996). The dredge material from 1995 was disposed of in the confined inwater disposal facility at Ross Island.

At Terminal 5, Berth 501, maintenance dredging was conducted in 1988 (2,250 cubic yards removed) and 1992 (1,350 cubic yards removed). The sediment was characterized as fine-grained with 63.2% silt/clay and a total volatile solids of <6.9%. A sediment quality summary of Berth 501 from September 16, 1995, indicated that detectable concentrations of the copper, lead, arsenic, PAHs, and TBT. The concentrations of metals and PAHs were below PSDDA screening levels, and the concentrations of TBT (average 45.8 ug/kg at Terminal 5) was above the current PSDDA TBT screening level of 30 ug/kg.

1.3 Site Description

Terminal 1 is an older marine facility which is undergoing conversion to non-maritime trade uses. The present marine activity is limited to shallow draft uses. Berth 104 was upgraded in 1992 and leased by the Maritime Administration from 1992-1994. It is currently used as a layberth. The Terminal 1 area is being redeveloped for urban waterfront uses. Future marine activity will continue to be limited to shallow draft needs.

Terminal 2 is a general cargo facility for breakbulk, container, and Ro-Ro vessels. Berths 205-206 were upgraded in 1966 and are currently used by deep draft vessels. Berth 204 was upgraded in 1986 and is also used by deep draft vessels. Based on the recent 10-year dredging history, it appears Berths 204-206 are depositional areas which will require dredging every few years.

Terminal 5 is a bulk cargo facility. Berth 501 is a grain terminal, primarily used for grain exports.

1.4 Permitting

A permit for routine maintenance dredging of Marine River Terminals along the Willamette River has been provided by the Corps to the Port of Portland. This permit (permit number 8760) expires on February 1, 2001. Additionally, the Port of Portland has received from the Corps a permit for disposal, at Morgan Bar, of material found suitable for unconfined open water disposal. Designation of acceptable disposal site(s) based on results of sediment characterization proposed herein is a critical remaining element prior to final project design.

2.0 PROGRAM OBJECTIVES AND CONSTRAINTS

The sediment characterization program objectives are summarized below:

- Characterize sediments to be dredged in conformance with Corps requirements to enable the Corps and Oregon Department of Environmental Quality (DEQ) to designate approved disposal option(s);

- Optimize the designation of Dredge Material Management Units acceptable for disposal inwater at the Morgan Bar disposal site while assuring that unacceptable sediments are disposed of at an approved confined inwater site;

- Collect, handle, and analyze representative sediment core samples of the proposed dredging prisms in accordance with protocols and Quality Assurance/Quality Control (QA/QC) requirements outlined in the Corps Draft Inland Testing Manual (June 1994);

- Composite and analyze sediment cores in a timely manner to meet the Port's maintenance dredging schedule and Corps requirements for sample holding times; and

- Locate representative sampling locations at Terminal 1, Berth 104, because sample access is limited by the vessel currently moored and grounded alongside the berth.

3.0 PROJECT TEAM AND RESPONSIBILITIES

The sediment characterization program will include: 1) project planning and agency coordination; 2) field sample collection; 3) laboratory preparation and analysis; 4) QA/QC management; and 5) final data report. Staffing and responsibilities are outlined below.

3.1 Project Planning and Coordination

Ms. Dana Siegfried, Port of Portland (Port), is the applicant's representative and the primary contact for administrative issues related to the Port's maintenance dredging program. Dr. Todd Thornburg, Hart Crowser, Seattle, WA will be the overall project manager responsible for developing and completing the sampling program, and the primary contact for technical issues related to this sampling plan and the sediment characterization report. Following plan approval by the Corps and DEQ, Dr. Thornburg will be responsible for timely and successful completion of the project. Dr. Thornburg will provide a copy of the approved sampling plan along with the Corps approval letter to all sampling and testing subcontractors, and coordinate any significant deviations from the approved sampling plan with the Corps and DEQ.

3.2 Field Sample Collection

Mr. Taku Fuji, Hart Crowser, will provide overall direction to the field sampling and laboratory analysis programs in terms of logistics, personnel assignments, field operations, and analytical laboratory selection. Mr. Fuji will supervise field collection of the sediment core samples. Mr. Fuji will also be responsible for assuring accurate sample positioning; recording sample locations, depths, and identification; assuring conformance to sampling and handling requirements including field decontamination procedures; photographing, physical evaluation, and logging the samples; and for chain of custody of the sample cores until they are delivered to the analytical laboratory.

3.3 Laboratory Preparation and Analyses

Mr. Fuji will be responsible for documenting sample preparation, observations, and chain of custody until the time he delivers the samples to Columbia Analytical Services in Kelso, WA. He will also instruct the analytical laboratory on the need to maintain required handling and analytical protocols including detection limit requirements for dredge material characterization. Mr. Fuji will ensure that archived sediments are stored under proper conditions.

Ms. Abbie Spielman, Project Chemist, at Columbia Analytical Services will be responsible for physical and chemical analysis. Columbia Analytical Services will handle and analyze the submitted samples in accordance with Corps analytical testing protocols and QA/QC requirements. A written report of analytical results and QA/QC data will be prepared by Columbia Analytical Services and included as an appendix in the final report.

3.4 QA/QC Management

Mr. Fuji, will serve as Quality Assurance Representative for the sediment characterization project. He will perform quality assurance oversight for both the field sampling and laboratory programs. Mr. Fuji will stay fully informed of field program procedures and progress during sample collection, and laboratory activities during sample preparation and analysis. He will record and correct any activities which vary from the written sampling and analysis plan. He will also review the laboratory analytical and QA/QC data to assure that data are valid and procedures meet the required analytical quality control limits. Upon completion of the sampling and analytical program, Mr. Fuji will incorporate findings into a QA/QC report.

3.5 Final Data Report

Dr. Thornburg will provide technical oversight and review of the Final Data Report and the data analysis it contains. Mr. Fuji will be responsible for preparation of the Final Data Report, including descriptions of sample locations and depths; sampling, handling, and analytical methods; QA/QC; and compilation and interpretation of data.

4.0 SAMPLE COLLECTION AND HANDLING PROCEDURES

4.1 Definitions

The following definitions apply to this sampling program:

- **Dredging Prism.** The entire volume of sediments to be dredged, related side-slopes and one-foot overdepth (Terminal 1 to elevation -26.0 feet, CRD, Terminal 2 to elevation -41.0 feet, CRD, and Terminal 5 to elevation -16.0 feet, CRD).

- **Sediment Core.** The entire cumulative length of sediment core extracted by the coring device. This extends from the sediment/water interface down to the total sampling depth of the hole. Each sediment core is a sampling location identified by number in Table 1 and on Figures 3, 4, and 5.

- **Core Section.** Each core section is approximately 4 feet long, except where the total sampling depth leaves a core section less than 4 feet at the bottom of the dredging prism. In a few cases, slightly longer core sections (to 5 or 6 feet depth) may be composited if the sediment sequence is observed to be homogeneous during core processing. Core sections comprising each sediment core are designated alphabetically, beginning with "A" for the 4-foot surface layer and proceeding downward from the top in 4-foot increments, B, C, etc., to the bottom core section. Core sections are composited within Dredge Material Management Units for laboratory analyses.

- **Dredged Material Management Unit (DMMU).** The volume of dredged material for which a separate decision on suitability for unconfined open-water disposal can be made. DMMUs are represented by chemical testing of a single sample, composited from one or more core sections within the DMMU. Typically, two cores will be composited for analysis in each DMMU.

- **Surface and Subsurface Sediments.** Material encountered within the sediment core for use in compositing and subsequent chemical analyses. Surface sediments include those encountered within 4 feet of the sediment/water interface, with subsurface sediments encountered at depths greater than 4 feet below the sediment/water interface.

4.2 Number of Samples Required

The numbers of samples proposed for each terminal were selected in accordance with the Dredged Material Management Manual developed for Grays Harbor and Willapa Bay (Corps, 1995). This manual presents a classification scheme for dredge material that assigns a dredging area one of four possible ranks; high, moderate, low-moderate, and low. In that order, these ranks represent a best professional judgment of concern or potential risk, typically reflective of a scale of decreasing potential for adverse biological effects or decreasing concentration of chemicals of concern. Urban and industrialized areas are generally ranked high in the absence of sediment quality data to the contrary. As a conservative assumption, the dredge materials at the river terminals were assumed to be rated high and the intensity of sediment sampling developed accordingly. Therefore, following Corps guidance, the maximum volume of sediment that can be represented by a single chemical analysis is 4,000 cubic yards.

The estimated volume of materials to be dredged is:

- 7,987 cubic yards for Terminal 1;
- 10,053 cubic yards at Terminal 2; and
- 1,221 cubic yards at Terminal 5.

To characterize this dredge material, we propose to submit two samples from Terminal 1, three samples from Terminal 2, and one sample from Terminal 5 for chemical analysis. The samples from Terminals 2 and 5 will consist of composited sediment cores (two cores per composite). Based on access limitations at Terminal 1, a single core will be analyzed in each of the two DMMUs.

4.3 Sampling and Compositing Scheme

The sampling and analysis program is developed with consideration of site-specific project and environmental factors. A key requirement is assuring that if an individual DMMU (represented by one or more core sections) is found unsuitable for unconfined open water disposal, then that unit can be feasibly dredged independently from surrounding clean sediments so that the contaminated material can be disposed of at an alternate approved confined inwater site.

4.3.1 Sampling Scheme

Basic criteria for selecting sampling locations and compositing for analysis are contained in Corps guidance documents (Corps, 1994 and 1995).

Sample Locations. The sampling locations at each Terminal will be established as shown on Figures 3 through 5. At Terminal 1, the sampling will be constrained by the presence of the 665-foot vessel "Green Mountain State" grounded at Berth 104. Sampling locations will be attempted around the bow and stern of the vessel, at sufficient depth to take 4-foot cores (Figure 3). At Terminal 2, six sediment cores will be collected at 400-foot intervals along a transect parallel to the dock face, providing two cores each in DMMUs representing Berths 204, 205, and 206, and at a distance of 13-feet perpendicular to the dock face (Figure 4). At Terminal 5, two sediment cores are proposed at locations along the inner wall of the slip (Figure 5).

Core Sampling Depths. At Terminal 1, sediment cores at each location will be collected from the sediment-water interface down to an elevation of -26.0 feet CRD, i.e., to the design elevation of -25.0 feet plus one foot overdredge. At Terminal 2, sediment cores at each location will be collected from the sediment-water interface down to an elevation of -41.0 feet CRD, i.e., to the design elevation of -40.0 feet plus one foot overdredge. At Terminal 5, sediment cores at each location will be taken from the sediment-water interface down to an elevation of -16.0 feet CRD, i.e., to the design elevation of -15.0 feet plus one foot overdredge.

4.3.2 Compositing Scheme

Sample compositing will be conducted at Terminals 2 and 5 (see Table 1). The goal of sample compositing is to control analytical chemistry costs while maintaining the overall objective of obtaining an accurate representation and definition of the dredging area.

4.4 Field Sampling Schedule

The field sampling schedule is constrained by the shortest sample holding time (seven days). To safely meet the holding times for composited samples, the field samples will be composited and delivered for laboratory testing within three days of sampling. It is projected that the entire sampling program can be completed within three working days.

Initiation of sediment sampling will be preceded by preparation and cleaning of sample coring and handling equipment, acquisition of appropriate EPA-approved decontaminated sample containers from the analytic laboratory, and establishment of sampling locations along the river terminals.

4.5 Field Operations and Equipment

The field crew will be mobilized from Hart Crowser's Seattle Office. The field crew will make sure all equipment is in good working order prior to initiating the sampling program. All field sampling and sediment handling will conform to the procedures outlined in the Health and Safety Plan presented in Appendix A.

4.5.1 Sediment Sampling Equipment

The sampling vessel to be employed for the coring program will be provided by David Evans and Associates, Inc., of Portland, Oregon. The vessel is a 30-foot aluminum hull vessel, powered by an inboard engine and jet pump propulsion system. The vessel is equipped with an A-frame, 2,000 lb. capacity windlass, lines and blocks for handling sampling equipment, washdown pump, digital echosounder, and an integrated navigation system. The positioning system will be a Differential Global Positioning System (DGPS) which will provide positions every second with submeter accuracy for precise positioning of sample locations. The backup positioning system will be staking and taping from landmarks onshore; this alternate method should provide reasonable accuracy given the close proximity of the sampling locations to the terminals (i.e., within 100 feet).

Sediment cores will be collected using a vibracore operated by Golder Associates, Inc. A vibracoring system collects a continuous profile of sediments below mudline. The system utilizes a high frequency vibrating coring device which penetrates into the underlying sediments with minimal distortion. This method is ideal for collecting long, relatively undisturbed cores from a variety of sediment types. The vibratory head assembly and core barrels are deployed from the A-frame of the David Evans vessel.

The field representative will log each sample on a chain of custody form, noting the location, date, and time of collection. Subsequent chain of custody forms will be used to track the submittal of specific samples to the laboratory. A complete record of drilling and sampling operations will be maintained on the Sediment Sampling Form shown on Figure 6. Soil descriptions will be prepared using the system shown on the Key to Sediment Logs, which is presented on Figure 7.

4.5.2 Positioning

The objective of the positioning procedure is to accurately ($\pm$2m) determine and record the positions of all sampling locations. This determination will be achieved by referencing each sampling location to state plane coordinates with the use of known survey control points and DGPS.

The following parameters will be documented at each sampling location:

- Horizontal location in state plane coordinates, as appropriate;
- Vertical elevation in feet (including mudline and river elevation above the mudline);
- Time and date; and
- River elevation referenced to Columbia River Datum.

These parameters will be measured using combinations of DGPS, river elevation gages, and back up methods (i.e., triangulation or taping to survey control points and/or terminal landmarks or structures).

Positioning while sampling will be performed using a DGPS which will provide positions every second with submeter accuracy for precise positioning of sample locations. The navigation system onboard the vessel will provide the vessel pilot with a navigation display to enable piloting to sample locations and recording of the exact location of the sediment core. As a back up, the visual horizontal triangulation method is proposed. Sampling locations will be identified by measuring the horizontal distance from the actual sampling location to a known survey control point and/or permanent structure to the nearest foot using an incremental tape measure. These horizontal measurements can be translated into state plane coordinates using project base maps.

4.5.3 Sample Collection Techniques

Sediment samples will be collected in the following manner:

- Vessel will maneuver to proposed sample locations and will anchor upstream of the proposed sample location.

- A decontaminated core tube the length of the desired penetration depth will be secured to the vibratory assembly and deployed from the vessel.

- The cable umbilical to the vibrator assembly will be drawn taut and perpendicular, as the core rests on the bottom sediment.

- Location of the umbilical hoist will be measured and recorded by the location control personnel, depth to sediment will be measured with a survey tape attached to the head assembly.

- A 4-inch, thin-walled, aluminum tube will be vibratory-driven into the sediment using two counter-rotating vibrating heads.

- A continuous core sample will be collected to the designated coring depth or until refusal.

- The depth of core penetration will be measured and recorded.

- The vibrator will be turned off and the core barrel will be extracted from the sediment using the winch.

- While suspended from the A-frame, the assembly and core barrel will be sprayed off and then placed on the vessel deck.

- The core sample will be evaluated at the visible ends of the core tube to ensure that retrieved sediment core reached the required depth and, if accepted, the core tube will be sectioned into four-foot lengths.

Sample recovery will be inspected relative to the following Hart Crowser acceptance criteria:

- Overlying water is present and the surface is intact;
- Calculated sediment compaction is not greater than 40 percent; and
- The core tube appears intact without obstruction or blocking.

Once the core samples are deemed acceptable, the cutter head will be removed and a cap will be placed over the end of the tube and secured firmly in place with duct tape. The core will then be removed from the sampler and the other end of the core will be capped and taped. A label identifying the core will be securely attached to the outside of the core and wrapped with transparent tape to prevent loss or damage of the label. The core sections will be stored on Blue Ice in coolers. The cores will be sealed tightly enough to prevent leakage or disturbance during transport.

As samples are collected, logs and field notes of all sediment samples will be maintained in a project notebook. Included in this log will be the following:

- Calculated elevation of each sediment sample as measured from the Columbia River Datum;

- Date and time of sampling.

- Initials of person supervising the sampling operation.

- Weather conditions.
- Sample location number and core section identification.
- Physical description of sediment.
- Chronological occurrence of events during sampling operations.

4.6 Equipment Decontamination Procedures

Sampling and sediment compositing equipment will be thoroughly cleaned prior to use and after each sample collection event. Sampling equipment will be decontaminated according to the following procedure:

- Wash with brush and Alconox soap;
- Rinse with tap water; and
- Rinse with deionized water.

After cleaning, all sampling equipment will be wrapped in foil or plastic to limit the risk of contamination.

All hand work (e.g., using stainless steel spoons for extracting the sample from the split cores, mixing the samples and filling sample containers) will be conducted with disposable latex gloves which will be rinsed with distilled water before and after handling each individual sample, as appropriate, to prevent sample contamination. Gloves will be disposed of between composites to prevent cross contamination between the DMMUs.

4.7 Sample Compositing and Subsampling

4.7.1 Extrusion

Core sections will have their sealed caps removed for extrusion. The sediment from each sample tube will be extruded onto a stainless steel tray using a foil-covered wooden dowel. The sample will be disturbed as little as possible when extruding. The foil covering on the dowel will be replaced between composites. Upon extrusion, the core will be split with a decontaminated stainless steel wire core splitter.

A color photograph will be taken and the sediment description of each core sample will be recorded on the sediment sampling log for the following parameters as appropriate and present:

- Sample recovery
- Physical soil description in accordance with the Unified Soil Classification System (includes soil type, density/consistency of soil, color)
- Odor (e.g., hydrogen sulfide, petroleum)
- Visual stratification, structure, and texture
- Vegetation
- Debris
- Biological Activity (e.g., detritus, shells, tubes, bioturbation, live or dead organisms)
- Presence of oil sheen
- Any other distinguishing characteristics or features

4.7.2 Compositing

Samples will then be composited by Hart Crowser per the compositing plan presented in Table 1 and in accordance with Corps guidance. For sediment composite samples, equal volumes of sediment will be removed from each core section comprising a composite. Sediments representing each composite sample will be placed in a stainless steel bowl and mixed using stainless steel mixing spoons or paddles. The composited sediment in the stainless steel bowl will be mixed until homogenous in color and texture.

4.7.3 Sample Volume

Approximately one liter of homogenized sample will be prepared to provide adequate volume for physical, and chemical laboratory analyses. Portions of each composite sample will be placed in appropriate containers obtained from the analytical chemistry laboratories. See Table 4 for container and sample size information.

Each sample container will be clearly labeled with the project name, sample/composite identification, type of analysis to be performed, date and time, and initials of person(s) preparing the sample, and referenced by entry into the log book. Samples will be stored at approximately 4°C until withdrawn for analysis.

4.9 Sample Transport and Chain of Custody Procedures

Containerized sediment samples will be transported to Columbia Analytical Services after compositing is completed. Specific sample shipping procedures will be as follows:

- Each cooler or container containing the sediment samples for analysis will be delivered to the laboratory within 24 hours of being sealed.
- Individual sample containers will be packed to prevent breakage and transported in a sealed ice chest or other suitable container.
- The shipping containers will be clearly labeled with sufficient information (name of project, time and date container was sealed, person sealing the container and consultant's office name and address) to enable positive identification.
- Glass jars will be separated in the shipping container by shock absorbent material (e.g., bubble wrap) to prevent breakage.
- Ice will be placed in separate plastic bags and sealed.
- A sealed envelope containing custody forms will be enclosed in a plastic bag and taped to the inside lid of the cooler.
- Signed and dated custody seals will be placed on all coolers prior to shipping.

Upon transfer of sample possession to the analytical laboratory, the custody form will be signed by the persons transferring custody of the sample container. Upon receipt of samples at the laboratory, the shipping container seal will be broken and the condition of the samples will be recorded by the receiver. Custody forms will be used internally in the lab to track sample handling and final disposition.

5.0 LABORATORY PHYSICAL AND CHEMICAL SEDIMENT ANALYSIS

5.1 Chemical Analyses Protocols

Laboratory testing procedures will be conducted in accordance with the Corps Draft Inland Testing manual. Several details of these procedures are discussed below.

5.1.1 Chain of Custody

A chain of custody record for each set of samples will be maintained throughout all sampling activities and will accompany samples and shipment to the laboratory. Information tracked by the chain of custody records in the laboratory include sample identification number, date and time of sample receipt, analytical parameters required, location and conditions of storage, date and time of removal from and return to storage, signature of person removing and returning the sample, reason for removing from storage, and final disposition of the sample.

5.1.2 Limits of Detection

The sediment composite samples identified in Table 1 will be analyzed for each of the parameters listed in Table 4. The analytical test methods and method detection limits to be achieved by the analytical laboratory are identified in Table 4. The testing laboratory (Columbia Analytical Services) is aware of the Corps detection limit requirements (i.e., screening levels in Corps, 1995) and will employ all reasonable means, including additional cleanup steps and method modifications, to bring detection limits below these screening levels. In addition, an aliquot (8 oz) of each composited sediment sample will be archived (frozen) at -20 °C for additional analysis if necessary.

In all cases, to avoid potential problems and leave open the option for retesting, sediments or extracts will be kept under proper storage conditions until the chemistry data are deemed acceptable by the Corps and DEQ.

5.1.3 Holding Times

All samples for physical and chemical testing will be maintained at the testing laboratory in accordance with the sample holding limitations and storage temperature requirements listed in Table 2.

5.1.4 Quality Assurance/Quality Control

The chemistry QA/QC requirements found in Table 3 will be met.

5.2 Laboratory Written Report

A written report will be prepared by the analytical laboratory documenting the activities associated with sample analyses. As a minimum, the following will be included in the report:

- Results of the laboratory analyses and QA/QC results.

- Protocols used during analyses.

- Chain of custody procedures, including explanation of any deviation from those identified herein.

- Any protocol deviations from the approved sampling plan.

- Location and availability of data.

As appropriate, this sampling plan may be referenced in describing protocols.

6.0 REPORTING

6.1 QA Report

The project quality assurance representative will prepare a quality assurance report based upon activities involved with the field sampling and review of the laboratory analytical data. The laboratory QA/QC reports will be incorporated by reference. This report will identify any field and laboratory activities that deviated from the approved sampling plan and the referenced protocols and will make a statement regarding the overall validity of the data collected. The QA/QC report will be incorporated into the Final Report.

6.2 Final Report

Hart Crowser will prepare a written report documenting all activities associated with collection, compositing, transportation, and analysis of samples. The chemical testing reports from the analytical laboratory will be included as appendices. As a minimum, the following will be included in the Final Report:

- Type of sampling equipment used.
- Protocols and procedures used during sampling and testing and an explanation of any deviations from the sampling plan protocols.
- Descriptions and core logs of each sample, including penetration and recovery depths, compositing intervals, mudline elevation, grain size, and geologic contacts.
- Methods used to locate the sampling positions within an accuracy of ±2m.
- Maps and tables identifying locations where the sediment samples were collected, reported in latitude and longitude to the nearest tenth of a second on State Plans Coordinates.
- A plan view of the project sites showing the terminals, bathymetry, and actual sampling locations.
- Chain of custody procedures used, and explanation of any deviations from the sampling plan procedures.

- Tabular summary of chemical testing results, with comparisons to Corps screening levels, and in the case of TBT, EPA draft screening levels.

- Final QA report as discussed above.

7.0 REFERENCES

Corps, 1994. Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual (Draft): Inland Testing Manual. EPA 823-B-94-002.

Corps, 1995. Dredged Material Evaluation Procedures and Disposal Site Management Manual: Grays Harbor and Willapa Bay, Washington. Final Report June 1995.

Weston, 1996. Recommendations for a Screening Level for Tributyltin in Puget Sound Sediment. Prepared for EPA Region 10 Superfund Program. April 1996.

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Table 1 - Proposed Sediment Sampling Locations, Depths, and Identification

Proposed Subsurface Core Location	Proposed Core Sample Bottom Elev. in Feet (CRD)	1996 Bathymetry in Feet (CRD)	Proposed Core Depth in Feet	DMMU Identification	Sample Identification	Approx. DMMU Volume in Cubic Yards
TERMINAL 1						
HC-VC-01	-26	-21	5	T1/B104	HC-T1-01	3,990
HC-VC-02	-26	-22	4	T1/B104	HC-T1-02	3,990
TERMINAL 2						
HC-VC-03	-41	-36	5	T2/B204	HC-T2-01	3,400
HC-VC-04	-41	-38	3	T2/B204	HC-T2-01	3,400
HC-VC-05	-41	-38	3	T2/B205	HC-T2-02	3,400
HC-VC-06	-41	-38	3	T2/B205	HC-T2-02	3,400
HC-VC-07	-41	-38	3	T2/B206	HC-T2-03	3,400
HC-VC-08	-41	-37	4	T2/B206	HC-T2-03	3,400
TERMINAL 5						
HC-VC-09	-16	-11	5	T5	HC-T5-01	1,220
HC-VC-10	-16	-13	3	T5	HC-T5-01	1,220

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Table 2 - Sample Storage Criteria

Sample Type	Holding Time	Sample Size[a]	Temperature[b]	Container
Particle Size	6 Months	100-200g (150 ml)	4°C	1-liter Glass (combined)
Total Solids	14 Days	125g (100 ml)	4°C	
Total Volatile Solids	14 Days	125 g (100 ml)	4°C	
Total Organic Carbon	14 Days	125 g (100 ml)	4°C	
Ammonia	7 Days	25 g (20 ml)	4°C	
Metals (except Mercury)	6 Months	50 g (40 ml)	4°C	
Semivolatiles, Pesticides and PCBs	14 Days until extraction 1 Year until extraction 40 Days after extraction	150 g (120 ml)	4°C 4°C 4°C	
Tributyltin	14 Days until extraction	50 g (40 ml)		
Mercury	28 Days	5 g (4 ml)	4°C	
Total Sulfides	7 Days	50g (40 ml)	4°C[c]	125 ml Plastic
Archive	1 year	--	-20°C	250 ml Glass

a. Recommended minimum field sample sizes for one laboratory analysis. Actual volumes to be collected have been increased to provide a margin of error and allow for retests.

b. During transport to the lab, samples will be stored on blue ice. The mercury and archived samples will be frozen immediately upon receipt at the lab.

c. The sulfides sample will be preserved with 5 ml of 2 Normal zinc acetate per 30 g of sediment.

Table 3 - Minimum Laboratory QA/QC

ANALYSIS TYPE	METHOD BLANKS	TRIPLI-CATES[5]	REPLI-CATES	MATRIX SPIKE[5]	SURRO-GATES[1]
Ammonia/Sulfides	X[5]	X			
Semivolatiles[2,3]	X[4]		X[6,7]	X	X
Pesticides/PCBs[2,3]	X[4]		X[6,7]	X	X
Metals	X[5]		X[5]	X	
Total Organic Carbon	X[5]	X			
Total Solids		X			
Total Volatile Solids		X			
Particle Size		X			

1. Surrogate spikes required for every sample, including matrix spiked samples, blanks and reference materials
2. Initial calibration required before any samples are analyzed, after each major disruption of equipment, and when ongoing calibration fails to meet criteria.
3. Ongoing calibration required at the beginning of each work shift, every 10-12 samples or every 12 hours (whichever is more frequent), and at the end of each shift
4. Frequency of Analysis (FOA) = one per extraction batch
5. FOA = 5% or one per batch, whichever is more frequent
6. FOA = <20 samples: one per batch; 20+ samples: 1 triplicate and additional duplicates for a minimum of 5% total replication
7. Matrix spike duplicate will be run

Table 4 - Analyte List and Targeted Detection Limits

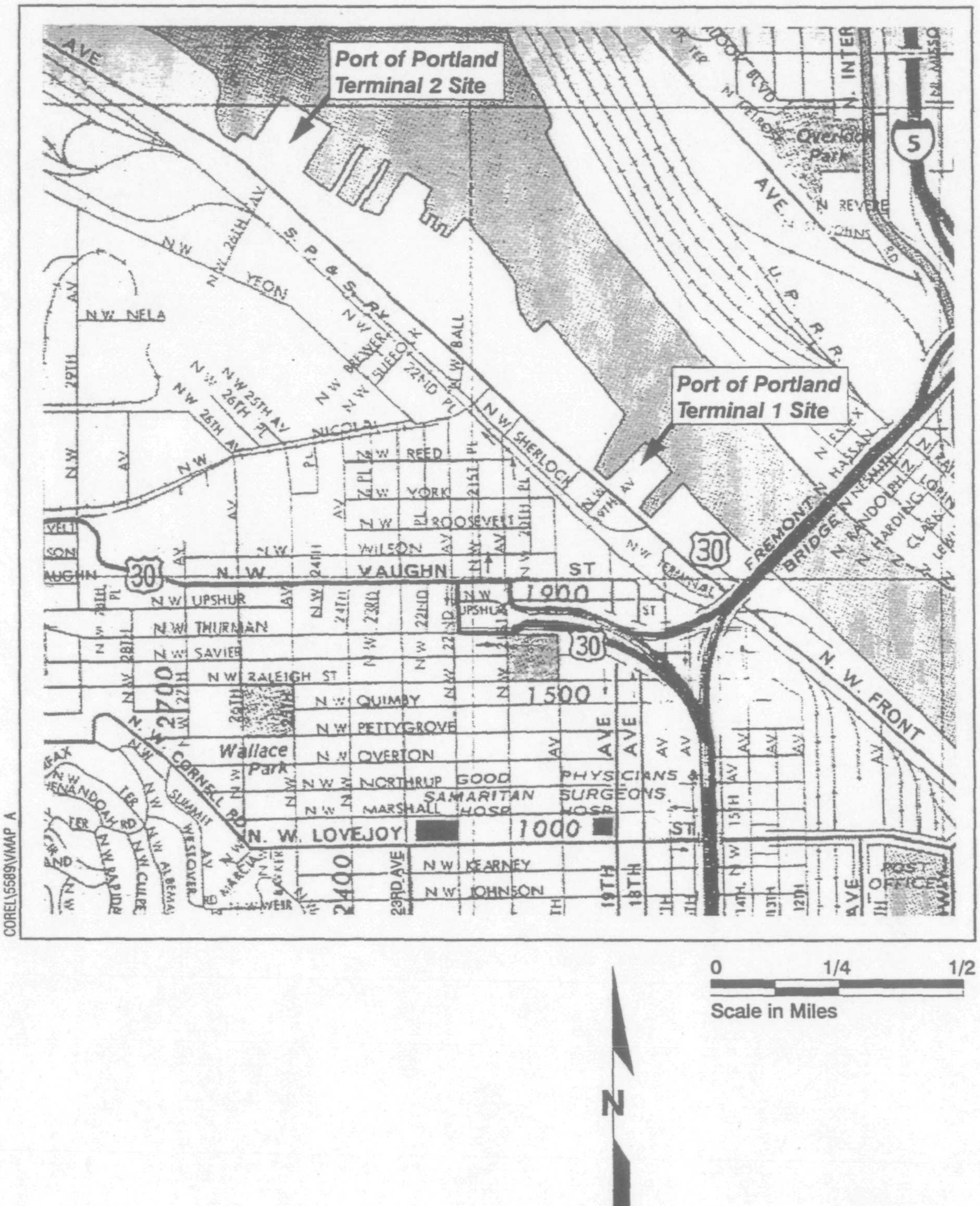
Analytes	Analytical Method	TDL[a]
CHEMICAL PARAMETERS		
Metals in mg/kg (ppm)		
Antimony	U.S. EPA Method 200.8	0.01
Arsenic	U.S. EPA Method 200.8.	0.3
Cadmium	U.S. EPA Method 200.8	0.01
Chromium	U.S. EPA Method 200.8	0.1
Copper	U.S. EPA Method 200.8	0.03
Lead	U.S. EPA Method 7421	0.01
Mercury	U.S. EPA Method 200.8	0.05
Nickel	U.S. EPA Method 200.8	0.1
Silver	U.S. EPA Method 200.8	0.01
Zinc	U.S. EPA Method 200.8	0.3
Tributyltin (as tin) in mg/kg (ppb)	Krone et al. 1989	1
Phenol in mg/kg (ppb)	GC/MS-SIM	
Phenol	GC/MS-SIM	10
2-Methylphenol	GC/MS-SIM	10
4-Methylphenol	GC/MS-SIM	10
2,4-Dimethylphenol	GC/MS-SIM	10
Pentachlorophenol	GC/MS-SIM	10
LPAHs in mg/kg (ppb)		
Naphthalene	GC/MS-SIM	10
2-Methylnaphthalene	GC/MS-SIM	10
Acenaphthylene	GC/MS-SIM	10
Acenaphthene	GC/MS-SIM	10
Fluorene	GC/MS-SIM	10
Phenanthrene	GC/MS-SIM	10
Anthracene	GC/MS-SIM	10
HPAHs in mg/kg (ppb)		

Table 4 - Analyte List and Targeted Detection Limits

Analytes	Analytical Method	TDL[a]
Fluoranthene	GC/MS-SIM	10
Pyrene	GC/MS-SIM	10
Benz(a)anthracene	GC/MS-SIM	10
Chrysene	GC/MS-SIM	10
Total benzofluoranthenes	GC/MS-SIM	10
Benzo(a)pyrene	GC/MS-SIM	10
Indeno(1,2,3-cd)pyrene	GC/MS-SIM	10
Dibenz(a,h)anthracene	GC/MS-SIM	10
Benzo(g,h,i)perylene	GC/MS-SIM	10
Pesticides/PCBs in mg/kg (ppb)		
Total PCBs	U.S. EPA Method 8080A	10
4,4'-DDE	U.S. EPA Method 8080A	2
4,4'-DDD	U.S. EPA Method 8080A	2
4,4'-DDT	U.S. EPA Method 8080A	2
Chlordane (alpha, gamma)	U.S. EPA Method 8080A	10
Aldrin	U.S. EPA Method 8080A	2
Dieldrin	U.S. EPA Method 8080A	2
Heptachlor	U.S. EPA Method 8080A	2
Lindane	U.S. EPA Method 8080A	2
CONVENTIONAL PARAMETERS		
Grain size	PSEP	0.0001 g
Percent solids	PSEP	0.1%
Total volatile solids	PSEP/EPA 160.4M	0.1%
Total organic carbon	PSEP/ASTM D4129-82M	0.1%
Total sulfides	PSEP	2 mg/kg
Ammonia	U.S. EPA Method 350.1	1 mg/kg

[a] TDL = Targeted detection limit based on dry weight and assuming solids content greater than 50 percent and total organic carbon content greater than 1.5 percent. The TDLs shown are adequate for comparison with SMS criteria.

Vicinity Map



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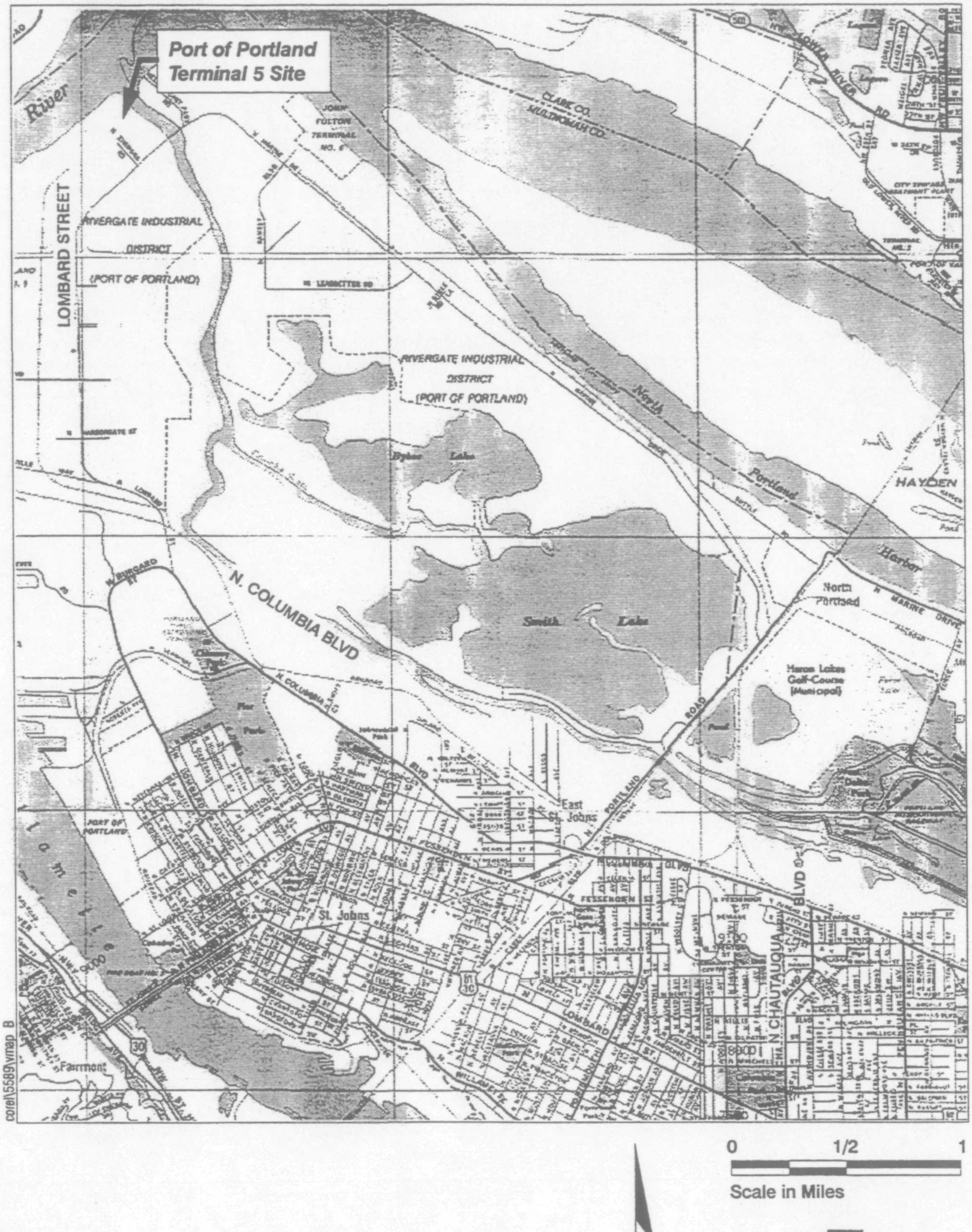
J-5589 10/96

Figure 1

Vicinity Map



HARTCROWSER

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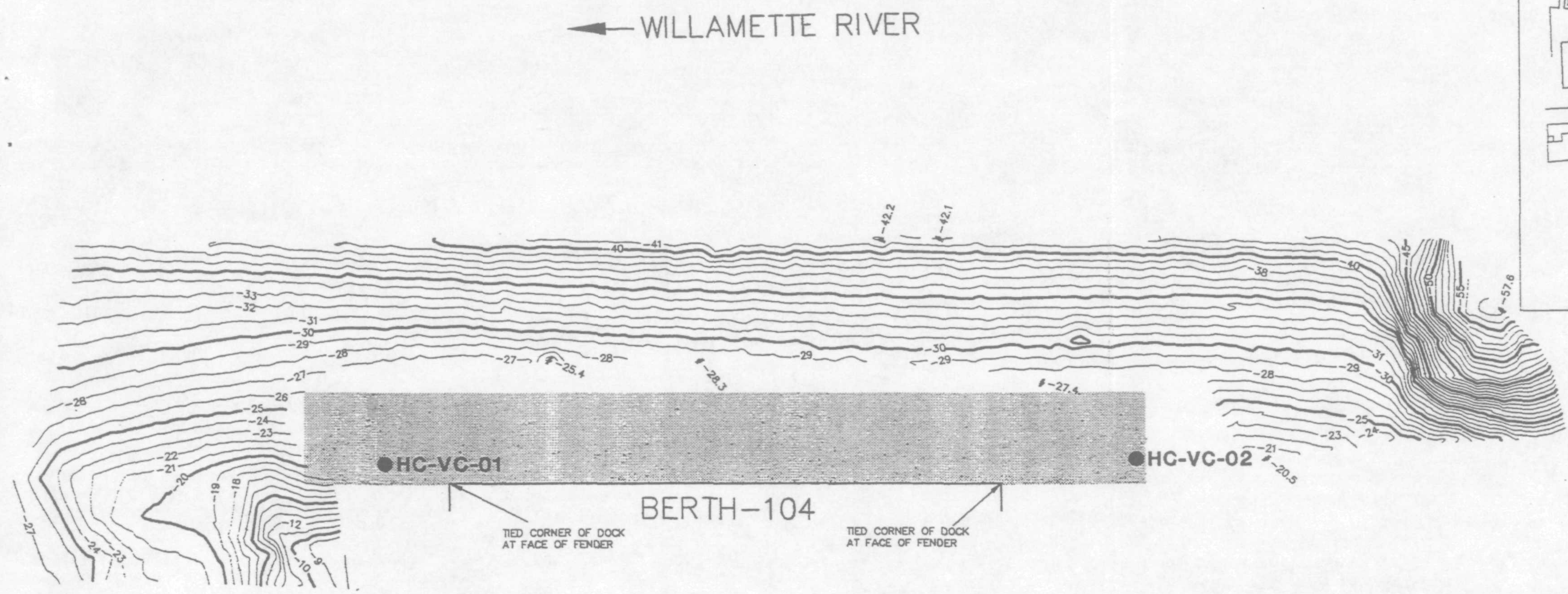
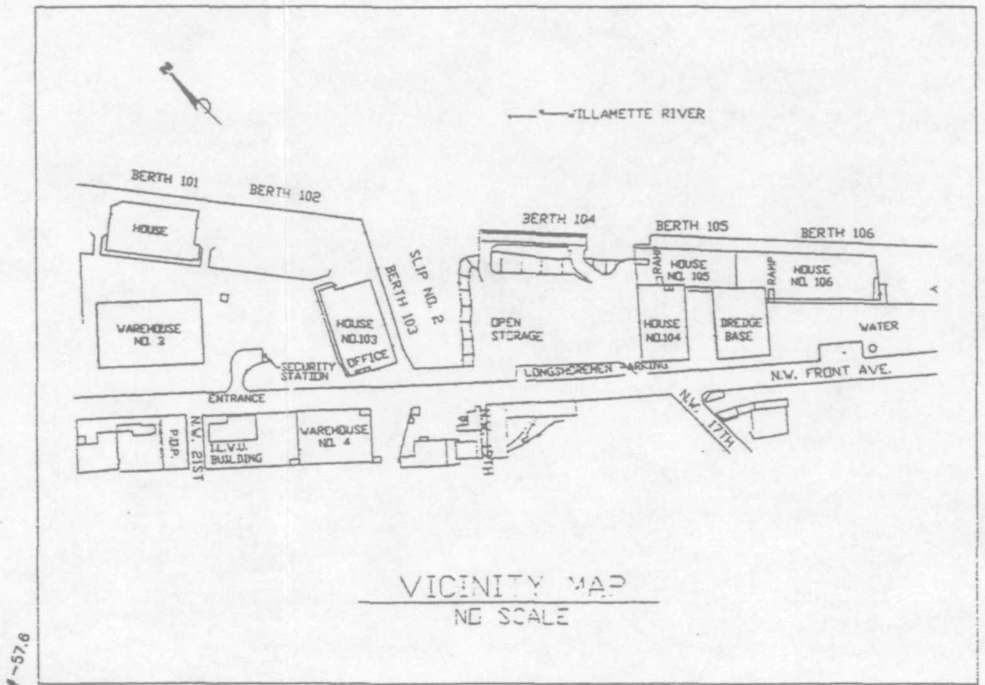
Figure 2

Proposed Sampling Location Plan - Terminal 1
Port of Portland





0 100 200
Scale in Feet

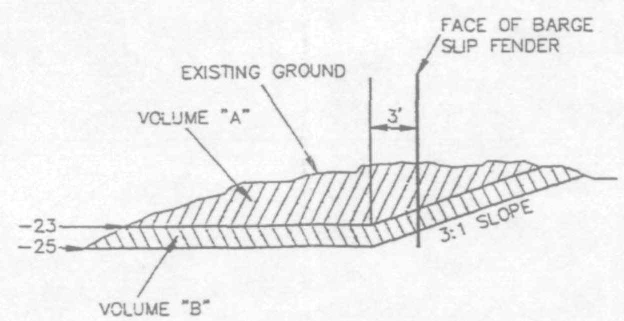
SEE NOTE 9

VOLUME CALCULATIONS

VOLUME "A"=4219 CUBIC YARDS

VOLUME "B"=3768 CUBIC YARDS

VOLUME "A" + VOLUME "B"=7987 CUBIC YARDS



NOT TO SCALE

Proposed Dredging Prism (Approximate*)

● HC-VC-01 Proposed Sampling Location and Number

*Note: Hydrographic survey incomplete because grounded vessel prohibited berth access.

1. HORIZONTAL DATUM: ASSUMED

2. CONTOURS ARE SHOWN IN FEET AND INDICATE DEPTHS BELOW COLUMBIA RIVER DATUM ZERO. THE TIDE BOARD USED IS LOCATED AT BERTH-103.

3. HORIZONTAL POSITIONS FOR NAVIGATION AND DATA COLLECTION WERE DETERMINED BY USING A HYDRO-II RANGE-AZIMITH SYSTEM.

4. BATHYMETRIC DATA WERE COLLECTED USING AN INNERSPACE-448 ECHOSOUNDER WITH AN 8° SINGLE BEAM TRANSDUCER.

5. SURVEY DATA WERE COLLECTED LONGITUDINALLY WITH THE DOCK FACE USING A TWENTY-FIVE FOOT LINE SPACING. THE SURVEY DATA COLLECTED ALONG EACH SURVEY LINE WERE THINNED USING A "SHOAL BIAS" METHOD TO AN APPROXIMATE HORIZONTAL SPACING OF 5 FEET.

6. THERE MAY BE BOTTOM FEATURES THAT ARE NOT SHOWN ON THIS MAP BECAUSE OF THE LINE SPACING INTERVAL. THIS SURVEY DOES NOT INCLUDE BATHYMETRIC DATA BETWEEN THE ADJACENT SURVEY LINES.

7. THIS BATHYMETRIC SURVEY IS REPRESENTATIVE OF THE CONDITION OF THE RIVER BOTTOM AT THE TIME OF THE SURVEY BASED ON THE LINE SPACING INTERVAL AND THINNING METHOD USED. THE CONDITION OF THE RIVER BOTTOM MAY CHANGE AT ANY TIME AFTER THE DATE OF THIS SURVEY.

8. HYDROGRAPHIC SURVEY DATA COLLECTED: OCTOBER 2, 1996

9. THIS SURVEY IS FOR A VOLUME ESTIMATE ONLY. THE VOLUME IS NOT ACCURATE AS THERE WAS A SHIP IN THE BERTH AT THE TIME OF THE SURVEY, AND NO DATA COULD BE COLLECTED UNDER THE SHIP. THE VOLUME WAS CALCULATED BY EXTRAPOLATING THE DATA COLLECTED AROUND THE SHIP. THE CONTOURS SHOWN ARE ACCURATE AS THEY WERE GENERATED FROM THE ONLY DATA THAT COULD BE COLLLECTED.

awp 10/18/96 1=100 hc.pcp
65890002

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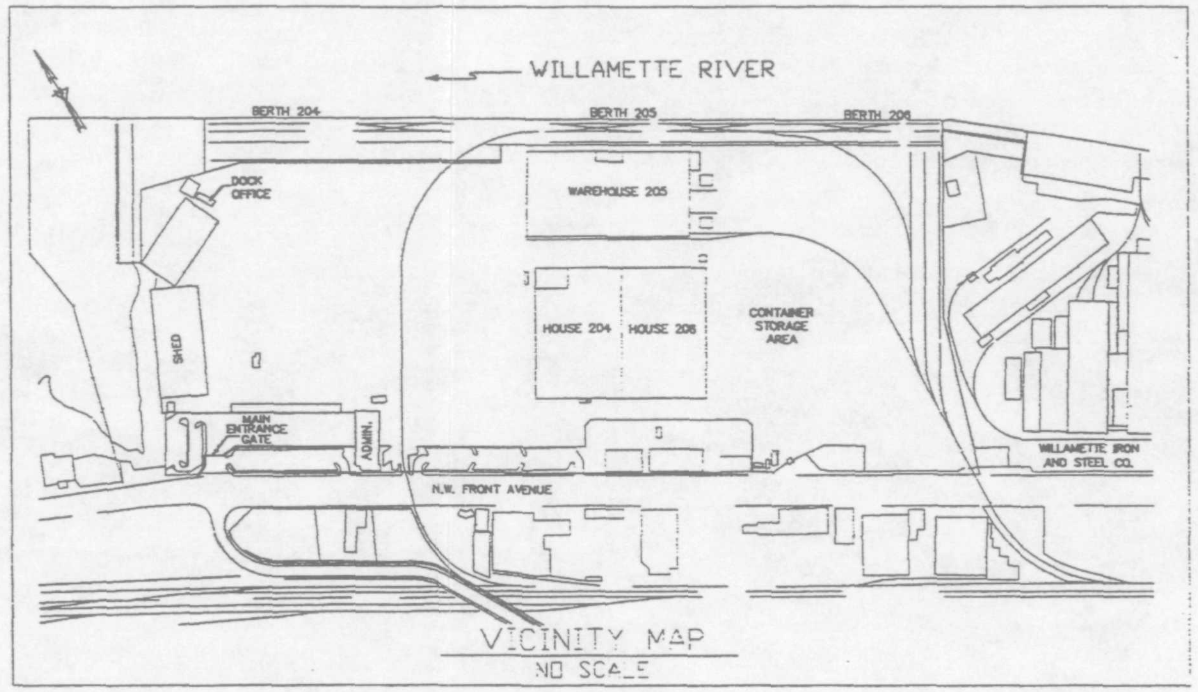
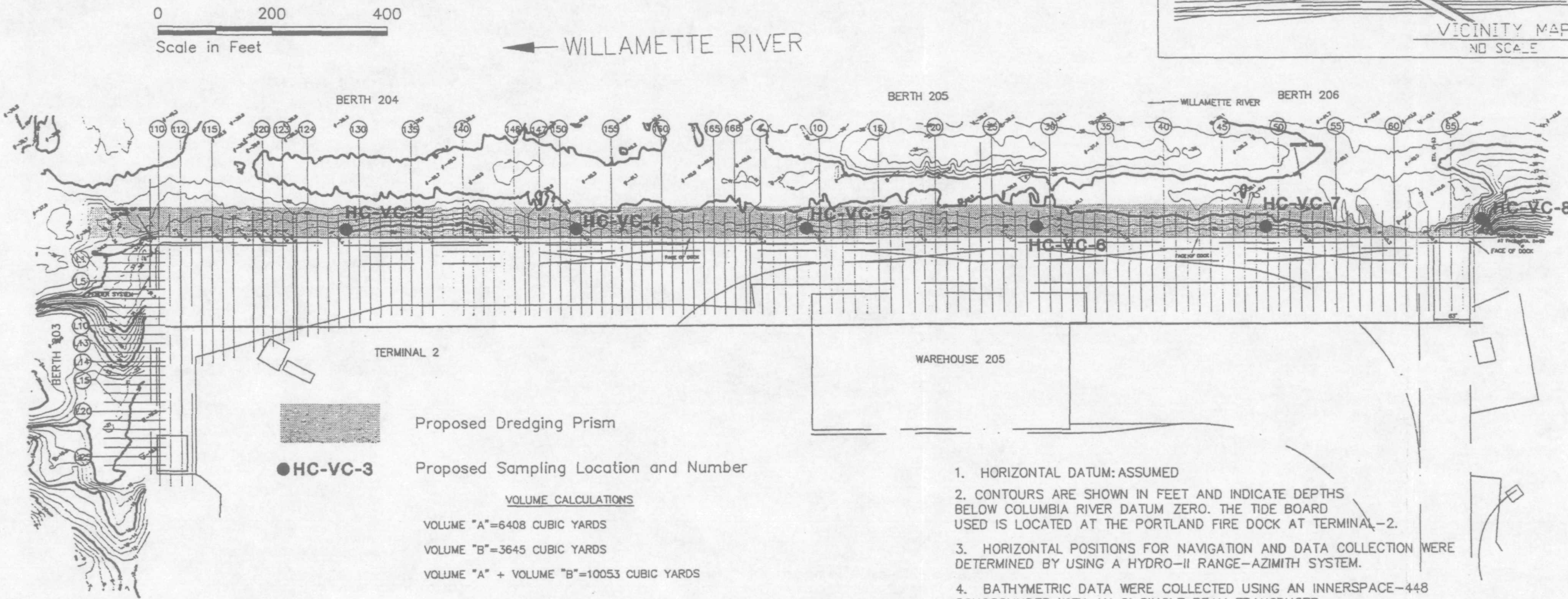
J-5589 10/96
Figure 3

Proposed Sampling Location Plan - Terminal 2

Port of Portland



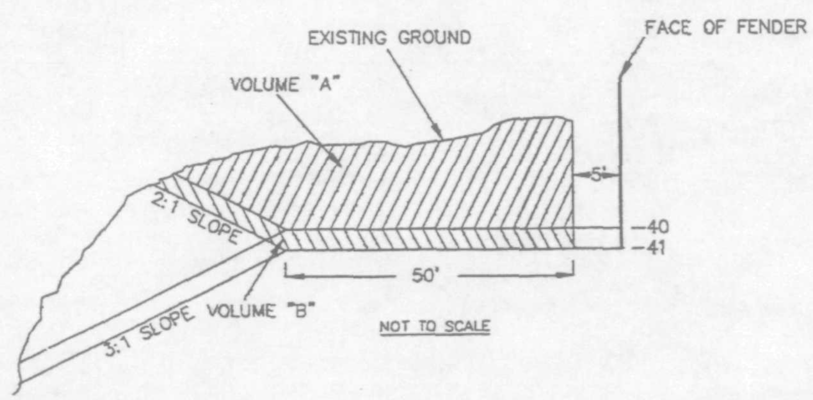


VOLUME CALCULATIONS

VOLUME "A"=6408 CUBIC YARDS

VOLUME "B"=3645 CUBIC YARDS

VOLUME "A" + VOLUME "B"=10053 CUBIC YARDS



1. HORIZONTAL DATUM: ASSUMED

2. CONTOURS ARE SHOWN IN FEET AND INDICATE DEPTHS BELOW COLUMBIA RIVER DATUM ZERO. THE TIDE BOARD USED IS LOCATED AT THE PORTLAND FIRE DOCK AT TERMINAL-2.

3. HORIZONTAL POSITIONS FOR NAVIGATION AND DATA COLLECTION WERE DETERMINED BY USING A HYDRO-II RANGE-AZIMITH SYSTEM.

4. BATHYMETRIC DATA WERE COLLECTED USING AN INNERSPACE-448 ECHOSOUNDER WITH AN 8" SINGLE BEAM TRANSDUCER.

5. SURVEY DATA WERE COLLECTED LONGITUDINALLY WITH THE DOCK FACE USING A TWENTY-FIVE FOOT LINE SPACING. THE SURVEY DATA COLLECTED ALONG EACH SURVEY LINE WERE THINNED USING A "SHOAL BIAS" METHOD TO AN APPROXIMATE HORIZONTAL SPACING OF 5 FEET.

6. THERE MAY BE BOTTOM FEATURES THAT ARE NOT SHOWN ON THIS MAP BECAUSE OF THE LINE SPACING INTERVAL. THIS SURVEY DOES NOT INCLUDE BATHYMETRIC DATA BETWEEN THE ADJACENT SURVEY LINES.

7. THIS BATHYMETRIC SURVEY IS REPRESENTATIVE OF THE CONDITION OF THE RIVER BOTTOM AT THE TIME OF THE SURVEY BASED ON THE LINE SPACING INTERVAL AND THINNING METHOD USED. THE CONDITION OF THE RIVER BOTTOM MAY CHANGE AT ANY TIME AFTER THE DATE OF THIS SURVEY.

8. HYDROGRAPHIC SURVEY DATA COLLECTED: SEPTEMBER 5, 1996

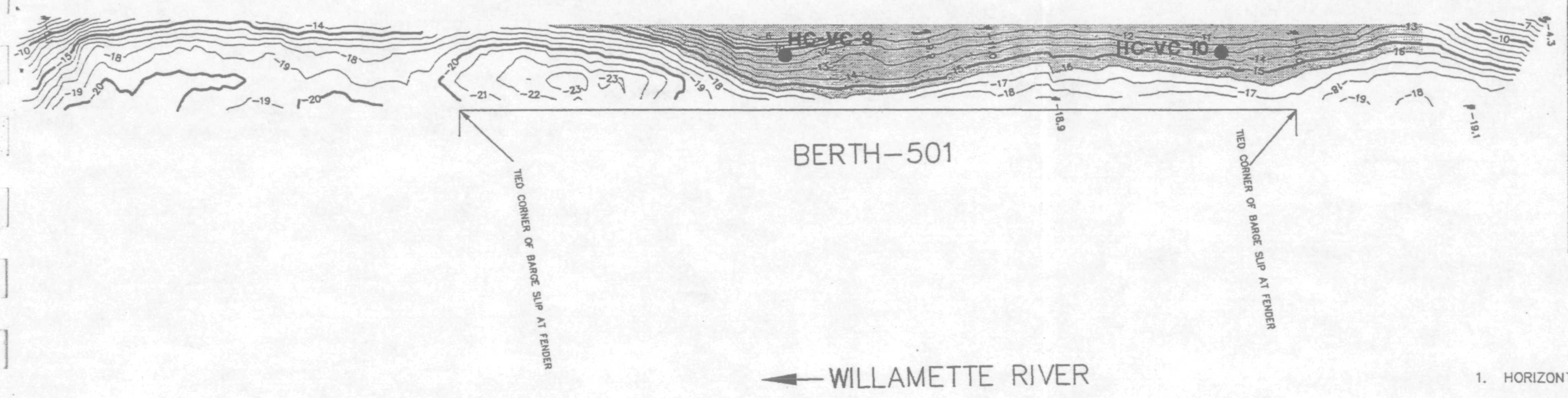
HARTCROWSER

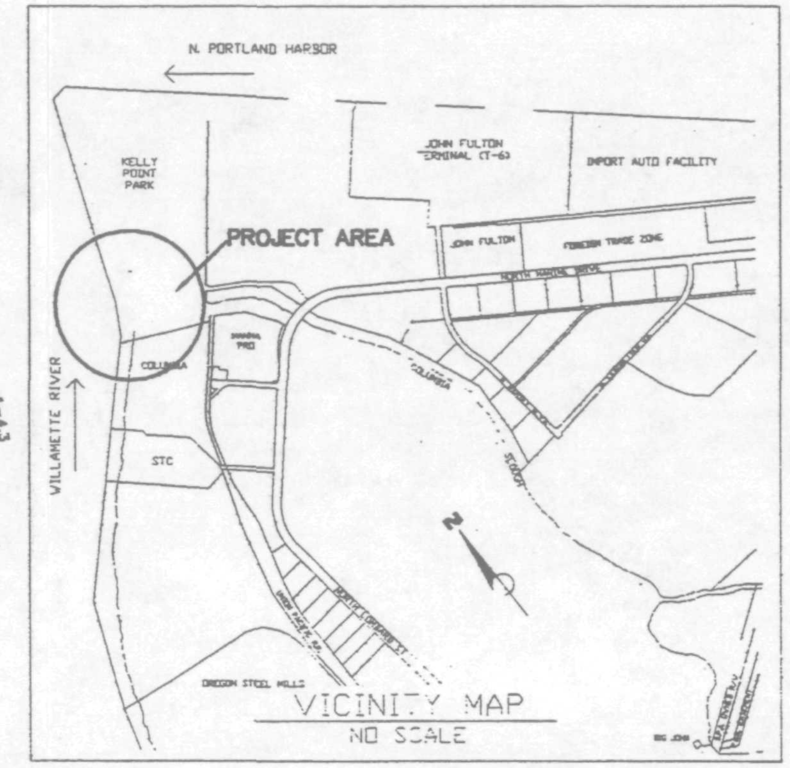
J-5589 10/96

Figure 4

swp 10/16/96 1=200 hc.pcp
55890001

Proposed Sampling Location Plan - Terminal 5
Port of Portland





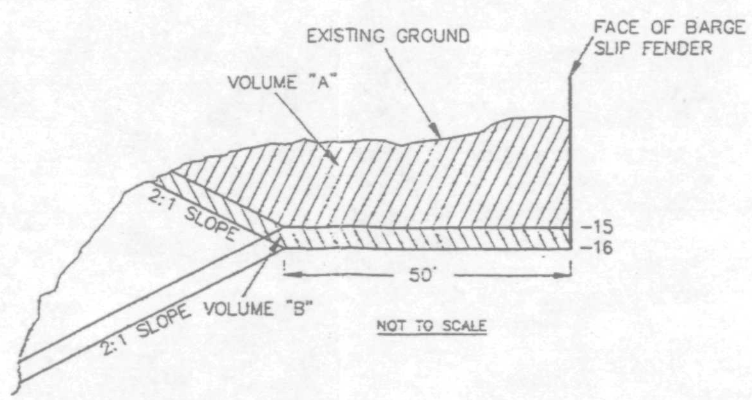
0 100 200
Scale in Feet

VOLUME CALCULATIONS

VOLUME "A"=847 CUBIC YARDS

VOLUME "B"=374 CUBIC YARDS

VOLUME "A" + VOLUME "B"=1221 CUBIC YARDS



Proposed Dredging Prism

● HC-VC-10 Proposed Sampling Location and Number

1. HORIZONTAL DATUM: ASSUMED

2. CONTOURS ARE SHOWN IN FEET AND INDICATE DEPTHS BELOW COLUMBIA RIVER DATUM ZERO. THE TIDE BOARD USED IS LOCATED KELLY POINT AT THE CONFLUENCE OF THE WILLAMETTE RIVER.

3. HORIZONTAL POSITIONS FOR NAVIGATION AND DATA COLLECTION WERE DETERMINED BY USING A HYDRO-II RANGE-AZIMITH SYSTEM.

4. BATHYMETRIC DATA WERE COLLECTED USING AN INNERSPACE-448 ECHOSOUNDER WITH AN 8" SINGLE BEAM TRANSDUCER.

5. SURVEY DATA WERE COLLECTED LONGITUDINALLY WITH THE DOCK FACE USING A TWENTY-FIVE FOOT LINE SPACING. THE SURVEY DATA COLLECTED ALONG EACH SURVEY LINE WERE THINNED USING A "SHOAL BIAS" METHOD TO AN APPROXIMATE HORIZONTAL SPACING OF 5 FEET.

6. THERE MAY BE BOTTOM FEATURES THAT ARE NOT SHOWN ON THIS MAP BECAUSE OF THE LINE SPACING INTERVAL. THIS SURVEY DOES NOT INCLUDE BATHYMETRIC DATA BETWEEN THE ADJACENT SURVEY LINES.

7. THIS BATHYMETRIC SURVEY IS REPRESENTATIVE OF THE CONDITION OF THE RIVER BOTTOM AT THE TIME OF THE SURVEY BASED ON THE LINE SPACING INTERVAL AND THINNING METHOD USED. THE CONDITION OF THE RIVER BOTTOM MAY CHANGE AT ANY TIME AFTER THE DATE OF THIS SURVEY.

8. HYDROGRAPHIC SURVEY DATA COLLECTED: SEPTEMBER 16, 1996

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Figure 5

Sediment Sampling Form

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Sediment Sampling Form

Project ______________________ Date ______________________

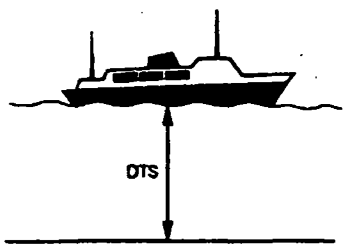
Job No. ______________________ HC Reps ______________________

Subcontractor ______________________ Conditions ______________________

Sample Location ______________________ Sample Method ______________________

Proposed Coordinates N: ______________

E: ______________



Elevation of Water ______________________

Tide ______________________

Elevation of Sediment ______________________

SAMPLE ACCEPTABILITY CRITERIA:
1. Overlying water is present
2. Water has low turbidity
3. Sampler is not overfilled
4. Surface is flat
5. Desired penetration depth

Run #	Time	Northing	Easting	Sampling Accepted Y/N	Comments (ie: penetration depth, biota, disturbance)

Sediment Description ____

____

____

Sample Container Type ____

Volume Filled ____

Analysis ____

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Figure 6

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Key for Sediment Logs

Sample Description

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual-manual classification methods of ASTM D 2488 were used as an identification guide.

Soil descriptions consist of the following:
Density/consistency, moisture, color, minor constituents, MAJOR CONSTITUENT, additional remarks.

Density/Consistency

Soil density/consistency in borings is related primarily to the Standard Penetration Resistance.
Soil density/consistency in test pits is estimated based on visual observation and is presented parenthetically on the test pit logs.

SAND or GRAVEL Density	Standard Penetration Resistance (N) in Blows/Foot	SILT or CLAY Consistency	Standard Penetration Resistance (N) in Blows/Foot	Approximate Shear Strength in TSF
Very loose	0 – 4	Very soft	0 – 2	<0.125
Loose	4 – 10	Soft	2 – 4	0.125 – 0.25
Medium dense	10 – 30	Medium stiff	4 – 8	0.25 – 0.5
Dense	30 – 50	Stiff	8 – 15	0.5 – 1.0
Very dense	>50	Very stiff	15 – 30	1.0 – 2.0
		Hard	>30	>2.0

Moisture

Dry	Little perceptible moisture
Damp	Some perceptible moisture, probably below optimum
Moist	Probably near optimum moisture content
Wet	Much perceptible moisture, probably above optimum

Minor Constituents

	Estimated Percentage
Not identified in description	0 – 5
Slightly (clayey, silty, etc.)	5 – 12
Clayey, silty, sandy, gravelly	12 – 30
Very (clayey, silty, etc.)	30 – 50

Legends

Surface Sample Acceptability Criteria:

1. Overlying water is present
2. Water has low turbidity
3. Sampler is not overfilled
4. Surface is flat
5. Penetration depth is acceptable

Estimated Percentage of other Minor Constituents

(ie. shells, wood, organics, plastic, metal brick, refuse)

	Estimated Percentage
Dusting	Trace on Surface
Trace	0–5
Moderate	5–20
Substantial	20–50

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J-5589 10/96
Figure 7

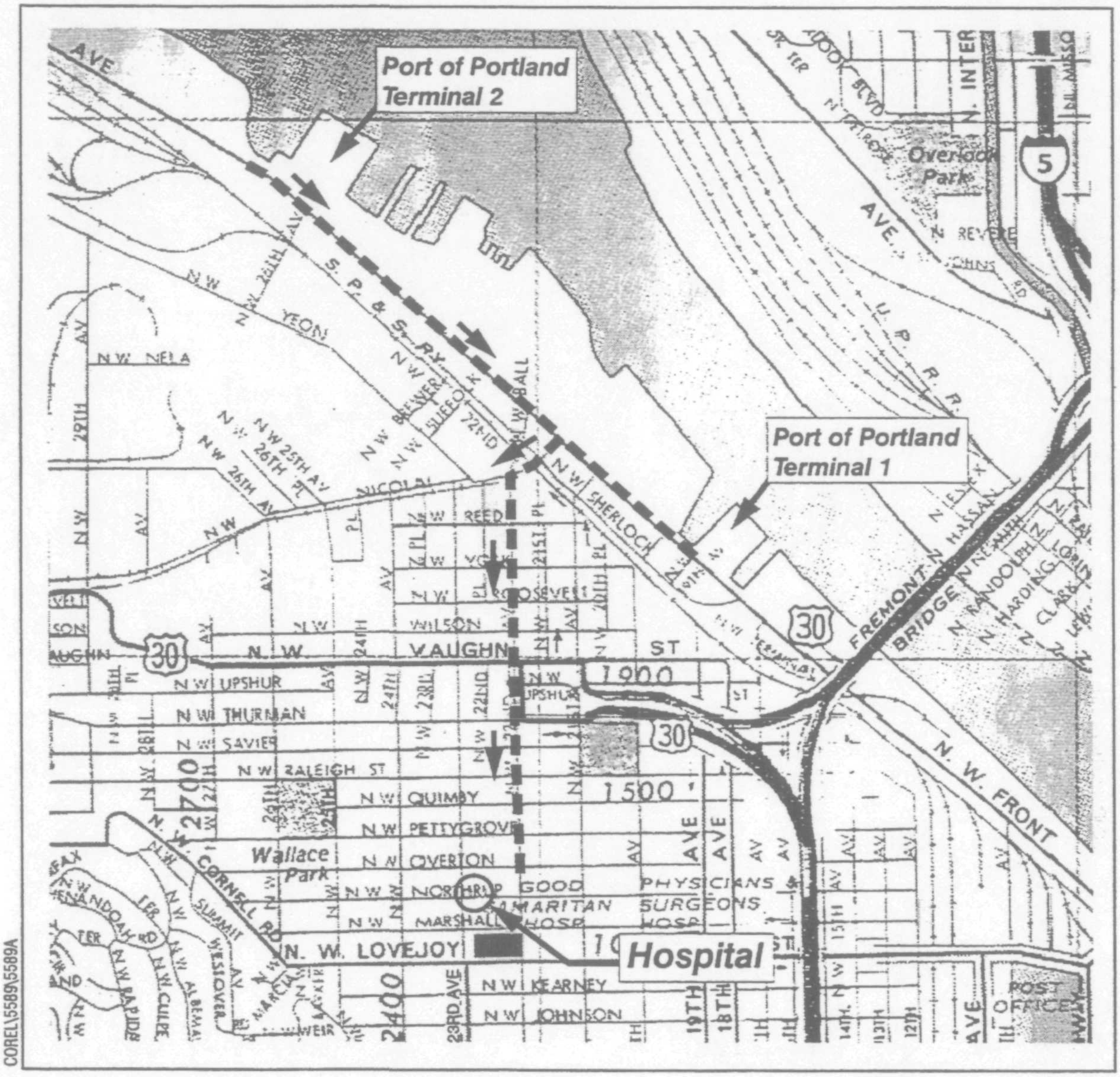
APPENDIX A
HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN
PORT OF PORTLAND - MARINE TERMINALS
PORTLAND, OREGON
DATE PREPARED: October 22, 1996

EMERGENCY CONTINGENCY INFORMATION

SITE LOCATION	Port of Portland - Marine Terminals Terminals 1, 2 and 5 on Willamette River Portland, Oregon
NEAREST HOSPITALS	Good Samaritan Hospital; Emergency Department NW 23rd and NW Northrup (503)229-7260 Bess Kaiser Medical Center 5055 N. Greeley (503)285-9321 The routes to the hospital are depicted on Figures A-1 and A-2.
EMERGENCY RESPONDERS	Police Department .... 911 Fire Department .... 911 Ambulance 911
EMERGENCY CONTACTS	Hart Crowser, Portland Office ...... (503)620-7284 Dana Siegfried, Port of Portland Facility Contact .... (503)731-7323
IN EVENT OF EMERGENCY, CALL FOR HELP AS SOON AS POSSIBLE	Give the following information: ╠ **Where You Are.** Address, cross streets, or landmarks Ξ **Phone Number** you are calling from ?? **What Happened.** Type of injury, accident # **How many persons** need help ?? **What is being done** for the victim(s) !! **You hang up last.** Let whomever you called hang up first

Emergency Route to Hospital Map



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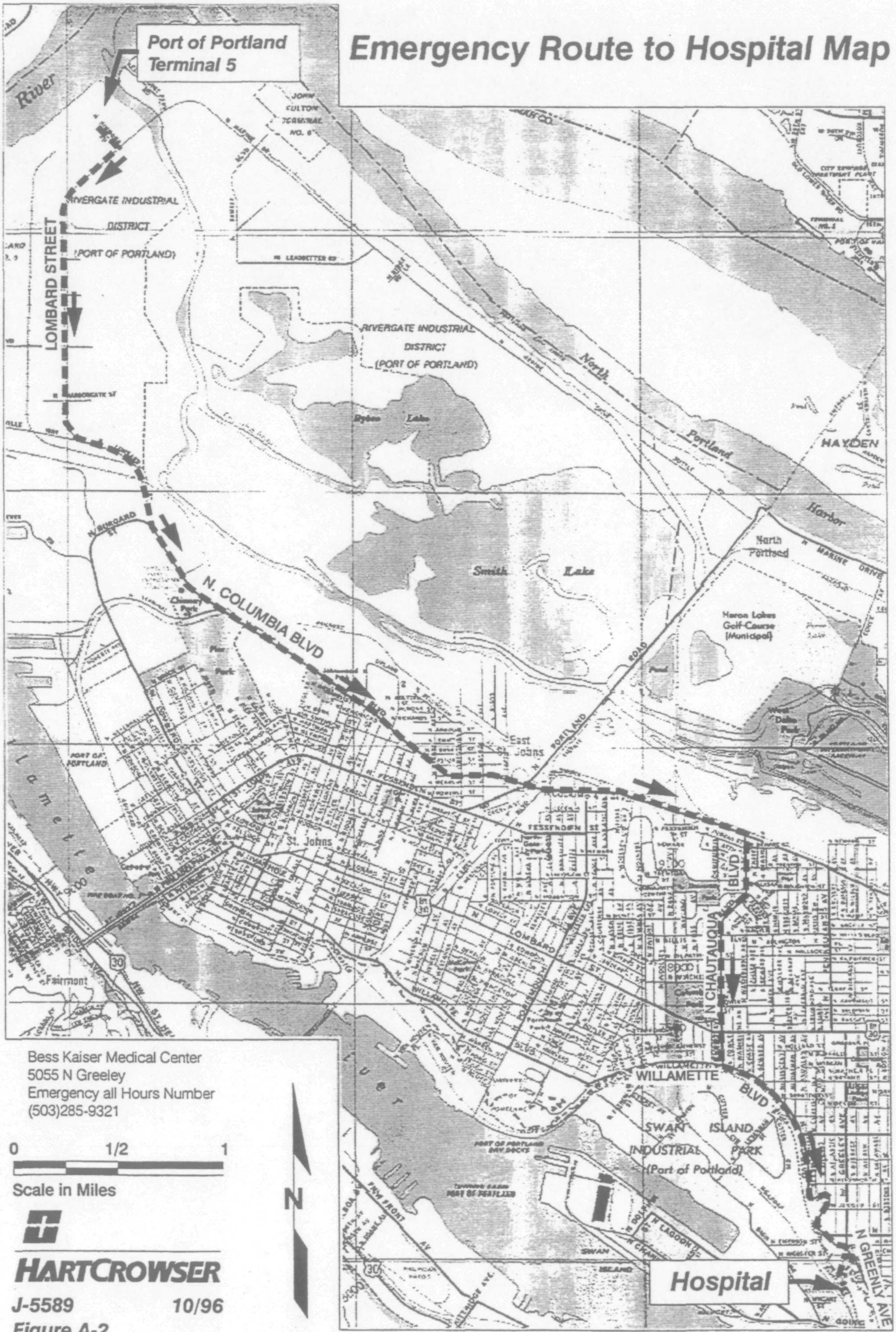
Good Samaritan Hospital
Emergency Department
NW 23rd and NW Northrup
503-229-7260

0 1/4 1/2
Scale in Miles

HARTCROWSER
J-5589 10/96
Figure A-1

Emergency Route to Hospital Map



Bess Kaiser Medical Center
5055 N Greeley
Emergency all Hours Number
(503)285-9321

0 1/2 1
Scale in Miles

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J-5589 10/96

Figure A-2

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SITE HEALTH AND SAFETY PLAN SUMMARY

SITE NAME: Port of Portland - Marine Terminals

LOCATION: Terminals 1, 2, and 5 on Willamette River, Portland, OR
See Figures A-1 and A-2

CLIENT: Port of Portland

PROPOSED DATES OF ACTIVITIES: Approximately October 28 through November 15, 1996

TYPE OF FACILITY: River Terminals

LAND USE OF AREA SURROUNDING FACILITY: Industrial

SITE ACTIVITIES: Collection of Sediment Cores

POTENTIAL SITE CONTAMINANTS: Tributyltin, PAHs, Metals (Pb, As, Ni, Zn)

ROUTES OF ENTRY: Airborne dust; skin contact with sediments and incidental ingestion of soil.

PROTECTIVE MEASURES: Engineering controls, safety glasses, safety boots, hard hat, gloves, protective clothing, and respirators.

MONITORING EQUIPMENT: MSA 361 or equivalent combustible gas, oxygen, and hydrogen sulfide meter

1.0 INTRODUCTION

1.1 Purpose and Regulatory Compliance

This site-specific Health and Safety Plan (H&S Plan) addresses procedures to minimize the risk of chemical exposures, physical accidents to on-site workers, and environmental contamination. The H&S Plan covers each of the 11 required plan elements as specified in 29 CFR 1910.120 or equivalent state regulations. Table A-1 lists the sections of this plan which apply to each of these required elements. When used together with the Hart Crowser General H&S Plan, this site-specific plan meets all applicable regulatory requirements.

Table A-1 - Location of Required Health and Safety Plan Elements in This Site-Specific H&S Plan

Required H&S Plan Element	Section in this Health and Safety Plan
Confined space entry	2.6 Other Physical Hazards
Decontamination	7.0 Decontamination
Emergency response plan	11.0 Emergency Response Plan
Medical surveillance	12.0 Medical Surveillance
Monitoring program	2.3 Air Monitoring and Action Levels
Names of key personnel	1.3 Chain of Command
Personal protective equipment	3.0 Protective Equipment, 4.0 Safety Equipment List
Safety and hazard analysis	2.0 Hazard Evaluation and Control Measures
Site control	5.0 Exclusion Areas, 9.0 Site Security and Control
Spill containment	10.0 Spill Containment
Training	13.0 Training Requirements

1.2 Distribution and Approval

This H&S Plan will be made available to all Hart Crowser personnel involved in field work on this project. It will also be made available to subcontractors and other non-employees who may need to work on the site. For non-employees, it must be made clear that the plan represents minimum safety procedures and that they are responsible for their own safety while present on site. The plan has been approved by the Hart Crowser Corporate Health and Safety (H&S) Manager. By signing the documentation form provided with this plan (Table A-3 located at the end of plan), project workers also certify their approval and agreement to comply with the plan.

1.3 Chain of Command

The chain of command for health and safety on this project involves the following individuals:

Project Manager—Todd Thornburg

The Project Manager has overall responsibility for the successful outcome of the project. The Project Manager, in consultation with the Corporate H&S Manager, makes final decisions regarding questions concerning the implementation of the site-specific H&S Plan. The Project Manager may delegate this authority and responsibility to the Project and/or Field H&S Managers.

Corporate H&S Manager—David E. Chawes, C.I.H.

The Hart Crowser Corporate H&S Manager has overall responsibility for preparation and modification of this H&S Plan. In the event that health and safety issues arise during site operations, he will attempt to resolve them in discussion with the appropriate members of the project team.

Project H&S Manager—Taku Fuji

The Project H&S Manager has overall responsibility for health and safety on this project. This individual ensures that everyone working on this project understands this H&S Plan. This individual will maintain liaison with the Hart Crowser Project Manager so that all relevant health and safety issues are communicated effectively to project workers.

Field H&S Manager—Taku Fuji

The Field H&S Manager is responsible for implementing this H&S Plan in the field. This individual also observes subcontractors to verify that they are following these procedures, at a minimum. The Field H&S Manager will also assure that proper protective equipment is available and used in the correct manner, decontamination activities are carried out properly, and that employees have knowledge of the local emergency medical system should it be necessary.

1.4 Site Work Activities

The following work task will be accomplished:

Collection of sediment cores.

1.5 Site Description

The site is composed of river freight terminals.

2.0 HAZARD EVALUATION AND CONTROL MEASURES

2.1 Toxicity of Chemicals of Concern

Based on previous site information and knowledge of the types of activities conducted at this location, the following chemicals may be present at this site: tributylin, PAHs, metals (As, Ni, Pb, Zn).

Health hazards of these chemicals are discussed below. This information covers potential toxic effects which might occur if relatively significant acute and/or chronic exposure were to happen. This information does not mean that such effects will occur from the planned site activities. In general, the chemicals, which may be encountered at this site, are not expected to be present at concentrations that could produce significant exposures. The types of planned work activities and use of monitoring procedures and protective measures will limit potential exposures at this site.

These standards are presented using the following abbreviations:

PEL Permissible exposure limit.

TWA Time-weighted average exposure limit for any 8-hour work shift.

STEL Short-term exposure limit expressed as a 15-minute time-weighted average and not to be exceeded at any time during a work day.

Tributyltin

According to the FDA (USFDA), the "symptoms of acute tin toxicity" (to humans) "are nausea, abdominal cramping, diarrhea, and vomiting." These symptoms have often followed consumption of canned fruit juices containing 1,400 ppm tin, canned salmon containing 650 ppm tin, and vodka punch containing 2,000 ppm tin. The latter had been held in a tin can. Based on low intestinal absorption of tin, the acute toxic symptoms are probably primarily the result of local irritation of the gastrointestinal tract. The current PEL for organic tin compounds, as tin, is 0.1 mg/m^3.

Polynuclear Aromatic Hydrocarbons (PAHs)

Exposure to PAHs can occur via inhalation of vapors, ingestion, and skin and eye contact. Skin contact can result in reddening or corrosion. Ingestion can cause nausea, vomiting, blood pressure fall, abdominal pain, convulsions, and coma. Damage to the central nervous system can also occur. The U.S. Department of Health and Human Services (1989) has classified 15 PAHs compounds as having sufficient evidence for carcinogenicity, while the U.S. EPA (1990) has classified at least 5 of the identified PAHs as human carcinogens. There are no currently assigned PEL-TWA for PAHs, but the closely related material coal tar is listed as coal tar pitch volatiles with a PEL-TWA of 0.2 mg/m^3.

Arsenic

Arsenic is toxic by inhalation and ingestion of dusts and fumes or by inhalation of arsine gas. Trivalent arsenic compounds are the most toxic to humans, with significant corrosive effects on the skin, eyes, and mucous membranes. Dermatitis also frequently occurs, and skin sensitization and contact dermatitis may result from arsenic trioxide or pentoxide. Trivalent arsenic interacts with a number of sulfhydryl proteins and enzymes, altering their normal biological function. Ingestion of arsenic can result in fever, anorexia, cardiac abnormalities, and neurological damage. Liver injury can accompany chronic exposure. Skin and inhalation exposure to arsenic has been associated with cancer in humans, particularly among workers in the arsenical-pesticide industry or copper smelters. The EPA currently classifies arsenic as a Class A, or confirmed, human carcinogen. Arsine is a highly toxic gaseous arsenical, causing nausea, vomiting, and hemolysis. The current PEL-TWA for organic and inorganic forms of arsenic is 0.01 mg/m^3.

Nickel

Nickel exposure can occur via inhalation of dust or fume, ingestion, and eye and skin contact. Nickel and its compounds are irritating to the eye and mucous membranes, and skin exposure frequently leads to sensitization and a chronic eczema referred to as "nickel itch." Elemental nickel and nickel salts are considered probable carcinogens via inhalation, and nickel carbonyl is clearly recognized as a human carcinogen. Animal studies have demonstrated health effects on the kidneys, liver, brain, and heart muscle. The current PEL-TWA for soluble nickel and insoluble nickel are 0.1 and 1.0 mg/m^3, respectively. The PEL-TWA for nickel carbonyl is 0.007 mg/m^3 as nickel.

Lead

Inorganic Lead. Inorganic lead exposure can occur via inhalation of dusts or metal fumes, ingestion of dusts, and skin and eye contact. The principal target organs of lead toxicity include the nervous system, kidneys, blood, gastrointestinal, and reproductive systems. Generalized symptoms of lead exposure include decreased physical fitness, fatigue, sleep disturbances, headaches, bone and muscle pain, constipation, abdominal pain, and decreased appetite. More severe exposure can result in anemia, severe gastrointestinal disturbance, a "lead-line" on the gums, neurological symptoms, convulsions, and death.

Neurological effects are among the most severe of inorganic lead's toxic effects and vary depending on the age of individual exposed. Effects observed in adults occur primarily in the peripheral nervous system, resulting in nerve destruction and degeneration. Wrist-drop and foot-drop are two characteristic manifestations of this toxicity.

The EPA also currently lists inorganic lead as a Group B2 probable human carcinogen via the oral route. This conclusion is based on feeding studies conducted in laboratory animals. The current PEL-TWA for inorganic lead is 0.05 mg/m^3. Occupational exposure to lead is also specifically regulated under WAC 296-62-07521, with an action level established at 0.03 mg/m^3 that triggers monitoring and other requirements.

Organo-Lead Compounds. The most notable organo-lead compounds are tetraethyl (TEL) and tetramethyl lead (TML). These chemicals are colorless liquids which have been used principally as anti-knock compounds in gasoline. When used as such, they are generally mixed with soluble dyes for identification purposes. In the environment, TEL is reported to decompose under sunlight to form crystals of mono-, di-, and triethyl lead compounds, which have a characteristic garlic-like odor.

TEL and TML can be toxic via inhalation, ingestion, percutaneous absorption, and skin and eye contact. Major target organs include the kidneys and the nervous, gastrointestinal, and cardiovascular systems. TEL is irritating to the eyes, and its decomposition products may be inhaled as dust, leading to irritation of the upper respiratory tract and convulsive sneezing. The dusts may also cause itching, burning, and redness of eyes and mucous membranes.

TEL and TML are also readily absorbed into the nervous system and are considerably more neurotoxic than inorganic lead. Minor intoxication by TEL or TML can result in nervous excitation, insomnia, and gastrointestinal symptoms. The most notable symptom of TEL poisoning and repeated exposure is encephalopathy (disease of the brain), characterized by symptoms of anxiety, delirium with hallucinations, delusions, convulsions, and acute psychosis. In contrast to inorganic lead intoxication, peripheral nerve damage is not observed. The current PEL-TWA for both TEL and TML is 0.075 mg/m^3 as lead.

Zinc

Zinc compounds can be hazardous by inhalation of dust and fumes, ingestion, and skin and eye contact. Zinc chloride is corrosive to skin and mucous membranes, and sensitization can occur resulting in dermatitis. Eye contact can produce inflammation and corneal ulceration. Ingestion can result in corrosive damage to the digestive tract. The current PEL-TWA for exposure to zinc chloride fume is 1 mg/m^3. Zinc chromate exhibits potential carcinogenic effects and is currently limited with a PEL-TWA of 0.05 mg/m^3. Zinc oxide is toxic via inhalation of fumes and dusts and may cause dermatitis. The current PEL-TWA for zinc oxide is 10 mg/m^3 as total dust and 5 mg/m^3 as the respirable fraction.

2.2 Potential Exposure Routes

Inhalation

Exposure via this route could occur if dusts become airborne during site activities. This is unlikely given the wet nature of the sediment cores.

Skin Contact

Exposure via this route could occur if contaminated sediments contact the skin or clothing. Protective clothing and decontamination activities specified in this plan will minimize the potential for skin contact with the contaminants.

Ingestion

Exposure via this route could occur if individuals eat, drink or perform other hand-to-mouth contact in the contaminated (exclusion) zones. Decontamination procedures established in this plan will minimize the inadvertent ingestion of contaminants.

2.3 Air Monitoring and Action Levels

Air monitoring will not be conducted based on the low potential for airborne dusts.

2.4 Fire and Explosion Hazard

Potentially explosive conditions are unlikely to be encountered. Field monitoring equipment will not be necessary to determine the percent of the lower explosive limit (LEL).

An ABC dry chemical fire extinguisher with a minimum charge of 10 pounds shall be a part of the sampling equipment brought to the site. Observe basic precautions such as no smoking or creation of sparks or open flames.

2.5 Cold Stress

Cold stress, or hypothermia, can result from abnormal cooling of the core body temperature.

Signs of Hypothermia

Hypothermia can result from abnormal cooling of the core body temperature. It is caused by exposure to a cold environment, and wind-chill as well as wetness or water immersion can play a significant role. The following discusses signs and symptoms as well as treatment for hypothermia.

Typical warning signs of hypothermia include fatigue, weakness, incoordination, apathy, and drowsiness. A confused state is a key symptom of hypothermia. Shivering and pallor are usually absent, and the face may appear puffy and pink. Body temperatures below 90° F require immediate treatment to restore temperature to normal.

Treatment of Hypothermia

Current medical practice recommends slow rewarming as treatment for hypothermia, followed by professional medical care. This can be accomplished by moving the person into a sheltered area and wrapping with blankets in a warm room. In emergency situations where body temperature falls below 90° F and heated shelter is not available, use a sleeping bag, blankets and/or body heat from another individual to help restore normal body temperature.

2.6 Other Physical Hazards

Trips/Falls

As with all field work sites, caution will be exercised to prevent slips on rain slick surfaces, stepping on sharp objects, etc. Care will be taken not to fall off the boat.

Noise

Appropriate hearing protection (ear muffs or ear plugs with a noise reduction rating of at least 25 dB) will be used for individuals working near an active drill rig or other high-noise generating equipment.

2.7 Hazard Analysis and Applicable Safety Procedures by Task

The work tasks and associated hazards, which may be anticipated during the operations described elsewhere in this work plan, and suitable control measures are presented in Table A-2.

Table A-2 - Hazard Analysis by Task

Work Task	Hazards	Protective Measures
Site reconnaissance	None anticipated	Level D PPE
Sample collection	Splashes, skin contact, inhalation	Level D PPE

Soil, Surface Water, and Groundwater Sampling

All sampling activities will be conducted under the assumption that the media is contaminated and appropriate personnel protection will be required.

3.0 PROTECTIVE EQUIPMENT

Workers performing general site activities where skin contact with free product or contaminated materials is not likely and inhalation risks are not expected will wear regular work clothes or rain suit, eye protection, hard hat, nitrile or neoprene-coated work gloves (as required), and safety boots.

4.0 SAFETY EQUIPMENT LIST

The following Safety Equipment must be available on site:

- Fire Extinguisher - 10 lb ABC
- First Aid Kit
- Eye Wash Kit

- Mobile Telephone
- Hard Hat
- PVC (or similar) rainsuit
- Neoprene Steel-Toed Boots
- Neoprene Outer Gloves/Nitrile or Latex Inner Gloves

5.0 EXCLUSION AREAS

If migration of chemicals from the work area is a possibility, or as otherwise required by regulations or client specifications, site control will be maintained by establishing clearly identified work zones. These will include the exclusion zone, contaminant reduction zone, and support zone, as discussed below.

5.1 Exclusion Zone

Exclusion zones will be established around the sample collection work area on the boat. Only persons with appropriate training and authorization from the Field H&S Manager will enter this area while work is being conducted there.

5.2 Contamination Reduction Zone

A contamination reduction zone will be established just outside the temporary exclusion zone to decontaminate equipment and personnel as discussed below. This zone will be clearly delineated from the exclusion zone and support zone. Care will be taken to prevent the spread of contamination from this area.

5.3 Support Zone

A support zone will be established outside the contamination reduction area to stage clean equipment, don protective clothing, take rest breaks, etc. This zone will be clearly delineated from the contaminant reduction zone using the means noted above.

6.0 MINIMIZATION OF CONTAMINATION

In order to make the work zone procedure function effectively, the amount of equipment and number of personnel allowed in contaminated areas must be minimized. In addition, the amounts of soil, water, or other media collected should not exceed what is needed for laboratory analysis and record samples.

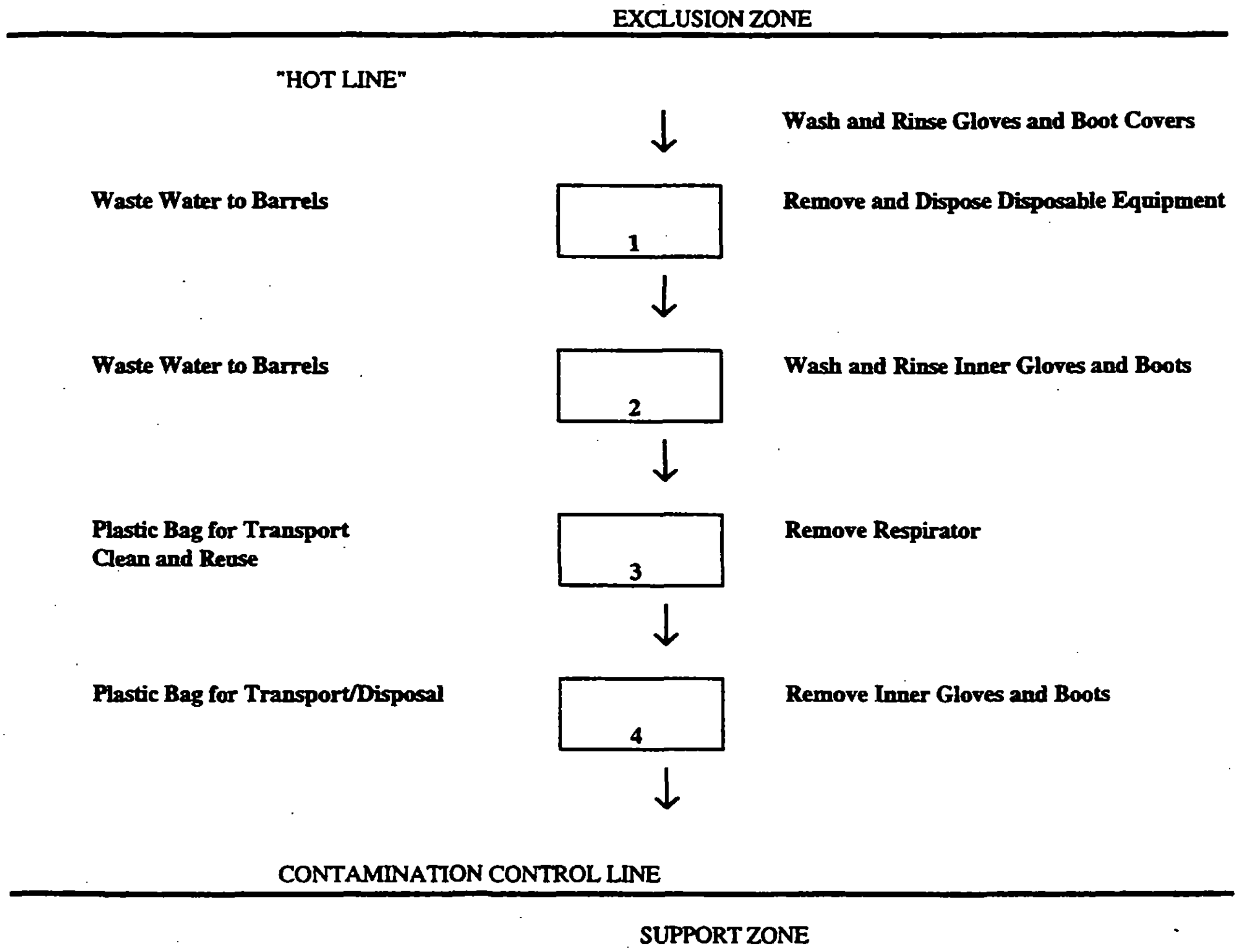
Do not kneel on contaminated ground, stir up unnecessary dust, or perform any practice that increases the probability of hand-to-mouth transfer of contaminated materials. Use plastic drop cloths and equipment covers where appropriate. Eating, drinking, chewing gum, smoking, or using smokeless tobacco are forbidden in the exclusion zone.

7.0 DECONTAMINATION

Decontamination is necessary to limit the migration of contaminants from the work zone(s) onto the site or from the site into the surrounding environment. Figure A-3 presents a layout for conducting decontamination within the sites zones discussed previously. Equipment and personnel decontamination are discussed in the following sections, and the following types of equipment will be available to perform these activities:

- Boot and Glove Wash Bucket and Rinse Bucket
- Scrub Brushes - Long Handled
- Spray Rinse Applicator
- Plastic Garbage Bags
- 5-Gallon Container Alkaline Decon Solution

Figure A-3 - Decontamination Layout



7.1 *Equipment Decontamination*

Proper decontamination (decon) procedures will be employed to ensure that contaminated materials do not contact individuals and are not spread from the site. These procedures will also ensure that contaminated materials generated during site operations and during decontamination are managed appropriately.

All non-disposable equipment will be decontaminated in the contamination reduction zone. Prior to demobilization, all contaminated portions of heavy equipment should be thoroughly cleaned. Heavy equipment may require steam cleaning. Soil and water sampling instruments should be cleaned with detergent solutions in portable buckets.

7.2 *Personnel Decontamination*

Personnel working in exclusion zones will perform decontamination in the contamination reduction zone prior to taking rest breaks, drinking liquids, etc. The following describes the procedures for decon activities.

Mini-decon Procedure:

1. In the contamination reduction zone, wash and rinse gloves and boots in portable buckets.
2. Remove protective suit.
3. Remove work boot and gloves. Inspect and discard if ripped or damaged.
4. Remove respirator (if worn) and clean off sweat and dirt using premoistened towelettes. Deposit used cartridges in plastic bag.

Full Decontamination Procedure:

1. In the contamination reduction zone, wash and rinse outer gloves and boots in portable buckets.
2. Remove outer gloves and protective suit and deposit in labeled container for disposable clothing.
3. Remove respirator, and place used respirator cartridges (if end of day) in container for disposable clothing.
4. If end of day, thoroughly clean respirator and store properly.
5. Remove inner gloves and discard into labeled container for disposable clothing.
6. Remove work boots without touching exposed surfaces, and put on street shoes. Put boots in individual plastic bag for later reuse.
7. Immediately wash hands and face using clean water and soap.

8. Shower as soon after work shift as possible.

8.0 DISPOSAL OF CONTAMINATED MATERIALS

All disposable sampling equipment and materials will be placed inside of a 6 mil polyethylene bag or other appropriate container. Disposable supplies will be removed from the site with the personnel.

9.0 SITE SECURITY AND CONTROL

Site security and control will be the responsibility of the Project Manager. The "buddy-system" will be used when working in designated hazardous areas. Any security or control problems will be reported to appropriate authorities.

10.0 SPILL CONTAINMENT

Sources of bulk chemicals subject to spillage are not expected to be encountered in this project. Accordingly, spill containment plan is not required for this project.

11.0 EMERGENCY RESPONSE PLAN

The Hart Crowser Emergency Response Plan outlines the steps necessary for appropriate response to emergency situations. The following paragraphs summarize the key Emergency Response Plan procedures for this project.

11.1 Plan Content and Review

The principal hazards addressed by the Emergency Response Plan include the following: fire or explosion, medical emergencies, uncontrolled contaminant release, and situations such as the presence of chemicals above exposure guidelines or inadequate protective equipment for the hazards present. However, in order to help anticipate potential emergency situations, field personnel shall always exercise caution and look for signs of potentially hazardous situations, including the following as examples:

- Visible or odorous chemical contaminants;
- Drums or other containers;
- General physical hazards, slippery or uneven surfaces, etc.);

- Live electrical wires or equipment;
- Underwater pipelines or cables; and
- Dangerous marine animals.

These and other potential problems should be anticipated and steps taken to avert problems before they occur.

The Emergency Response Plan shall be reviewed and rehearsed, as necessary, during the on-site health and safety briefing. This ensures that all personnel will know what their duties shall be if an actual emergency occurs.

11.2 Plan Implementation

The Field H&S Manager shall act as the lead individual in the event of an emergency situation and evaluate the situation. He/she will determine the need to implement the emergency procedures, in concert with other resource personnel including client representatives, the Project Manager, and the Corporate H&S Manager. Other on-site field personnel will assist the Field H&S Manager as required during the emergency.

In the event that the Emergency Response Plan is implemented, the Field H&S Manager or designee is responsible for alerting all personnel at the affected area by use of a signal device (such as a hand-held air horn) or visual or shouted instructions, as appropriate.

Emergency evacuation routes and safe assembly areas shall be identified and discussed in the on-site health and safety briefing, as appropriate. The buddy-system will be employed during evacuation to ensure safe escape, and the Field H&S Manager shall be responsible for roll call to account for all personnel.

11.3 Emergency Response Contacts

Site personnel must know whom to notify in the event of Emergency Response Plan implementation. The following information will be readily available at the site in a location known to all workers:

- Emergency Telephone Numbers: see list at the beginning of this plan;

- Route to Nearest Hospital: see list and route maps (Figure A-1 and A-2) at the beginning of this plan;

- Site Descriptions: see the description at the beginning of this plan; and

- If a significant environmental release of contaminants occurs, the federal, state, and local agencies noted in this plan must be immediately notified. If the release to the environment includes navigable waters also notify:
  - National Response Center at (800) 424-8802
  - EPA at (908) 321-6660

In the event of an emergency situation requiring implementation of the Emergency Response Plan (fire or explosion, serious injury, tank leak or other material spill, presence of chemicals above exposure guidelines, inadequate personnel protection equipment for the hazards present, etc.), cease all work immediately. Offer whatever assistance is required, but do not enter work areas without proper protective equipment. Workers not needed for immediate assistance will decontaminate per normal procedures (if possible) and leave the work area, pending approval by the Field H&S Manager for restart of work. The following general emergency response safety procedures should be followed.

11.4 Fires

Hart Crowser personnel will attempt to control only very small fires. If an explosion appears likely, evacuate the area immediately. If a fire occurs which cannot be controlled with the 10-pound ABC fire extinguisher located in the field equipment, then immediate intervention by the local fire department or other appropriate agency is imperative. Use these steps:

- Evacuate the area to a previously agreed upon, upwind location;
- Contact fire agency identified in the site specific plan; and
- Inform Project Manager or Field H&S Manager of the situation.

11.5 Medical Emergencies

Contact the agency listed in the site-specific plan if a medical emergency occurs. If a worker leaves the site to seek medical attention, another worker should accompany the patient. When in doubt about the severity of an accident or exposure, always seek medical attention as a conservative approach. Notify the Project Manager of the outcome of the medical evaluation as soon as possible. For minor cuts and bruises, an on-site first aid kit will be available.

- If a worker is seriously injured or becomes ill or unconscious, immediately request assistance from the emergency contact sources noted in the site-specific plan. Do not attempt to assist an unconscious worker in an untested or known dangerous confined space without applying confined space entry procedures or without using proper respiratory protection, such as a self contained breathing apparatus (SCBA).

- In the event that a seriously injured person is also heavily contaminated, use clean plastic sheeting to prevent contamination of the inside of the emergency vehicle. Less severely injured individuals may also have their protective clothing carefully removed or cut off before transport to the hospital.

11.6 Uncontrolled Contaminant Release

In the event of a hazardous material spill, attempt to stop and contain the flow of material using absorbents, booms, dirt, or other appropriate material. Prevent migration of liquids into streams or other bodies of water by building trenches, dikes, etc. Drum the material for proper disposal or contact a spill removal firm for material cleanup and disposal, as required. Observe all fire and explosion precautions while dealing with spills.

11.7 Potentially High Chemical Exposure Situations/Inadequate Protective Equipment

In some emergency situations, workers may encounter localized work areas where exposure to previously unidentified chemicals could occur. A similar hazard includes situations where chemicals are present above permissible exposure levels and/or above the levels suitable for the personnel protective equipment at hand on-site. If these situations occur, immediately stop work and evacuate the work area. Do not reenter the area until appropriate help is available and/or appropriate personnel protective equipment is obtained. Do not attempt to rescue a downed worker from such areas without employing confined space entry procedures. Professional emergency response assistance (fire department, HAZMAT team, etc.) may be necessary to deal with this type of situation.

11.8 Other Emergencies

Depending on the type of project, other emergency scenarios may be important at a specific work site. These scenarios will be considered as part of the site-specific plan and will be discussed during the on-site safety briefing, as required.

11.9 Plan Documentation and Review

The Field H&S Manager will notify the Project H&S Manager as soon as possible after the emergency situation has been stabilized. The Project Manager or H&S Manager will notify the appropriate client contacts, and regulatory agencies, if applicable. If an individual is injured, the Field H&S Manager or designate will file a detailed Accident Report with the Corporate H&S Manager within 24 hours.

The Project Manager and the Field, Project, and Corporate H&S Managers will critique the emergency response action following the event. The results of the critique will be used in follow-up training exercises to improve the Emergency Response Plan.

12.0 MEDICAL SURVEILLANCE

A medical surveillance program has been instituted for Hart Crowser employees having exposure to hazardous substances. Exams are given before assignment, annually thereafter, and upon termination. Content of exams is determined by the Occupational Medicine physician in compliance with applicable regulations and is detailed in the General H&S Plan.

Each team member will have undergone a physical examination as noted above in order to verify that he/she is physically able to use protective equipment, work in hot environments, and not be predisposed to occupationally induced disease. Additional exams may be needed to evaluate specific exposures or unexplainable illness.

13.0 TRAINING REQUIREMENTS

Hart Crowser employees who perform site work must understand potential health and safety hazards. All employees potentially exposed to hazardous substances, health hazards, or safety hazards will have completed 40 hours of off-site initial hazardous materials health and safety training or will possess equivalent training by past experience. They will also have a minimum of three days of actual field experience under the direct supervision of a trained supervisor. All employees will have in their possession evidence of completing this training. Employees will also complete annual refresher, supervisor, and other training as required by applicable regulations.

Prior to the start of each work day, the Field H&S Manager will review applicable health and safety issues with all employees and subcontractors working on the site, as appropriate. These briefings will also review the work to be accomplished, with an opportunity for questions to be asked.

14.0 REPORTING, REPORTS, AND DOCUMENTATION

The Field Health and Safety Report will be completed daily by the Hart Crowser Field Health and Safety Manager or designated individual. In the event that accidents or injuries occur during site work, the Project Manager will be informed, who will notify the client immediately. Hart Crowser staff and subcontractors on this site will sign the Record of H&S Communication document (Table A-3), which will be kept on site during work activities and recorded in the project files.

PORTH&S.doc

Table A-3 - Record of Health and Safety Communication*

PROJECT NAME:			
SITE CONTAMINANTS:			
PPE REQUIREMENTS (check all that apply): X Safety glasses X Safety boots X Hard hat	X Gloves (specify) ____ X Clothing (specify) ____ __Respirator (specify) ____ __Other (specify) ____		
The following personnel have reviewed a copy of the Site-specific Health and Safety Plan. By signing below, these personnel indicate that they have read the plan, including all referenced information, and that they understand the requirements which are detailed for this project.			
PRINTED NAME	SIGNATURE	PROJECT DUTIES	DATE

*PROJECT MANAGER: PLEASE ROUTE A COPY OF THIS FORM TO THE CORPORATE H&S MANAGER WHEN COMPLETED.